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THE WHOLE FORMING A LIBRARY OF PATHOLOGY AND PRACTICAL MEDICINE,
AND A DIGEST OF MEDICAL LITERATURE.

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44. *What are the humours of the rabid animal which contain the virus perpetuating this malady? And what is the mode in which this virus acts in producing its fatal effects?*—These questions have a real importance as respects the prevention and prophylactic treatment of rabies; but they are beset with difficulties.—(a.) As to the first of these, the evidence is rather negative than positive. M. TROLLET, MAGENDIE, and others have shown, by direct experiment and observation, that neither the blood, nor the flesh, nor the milk, nor the seminal fluid, nor the breath of the enraged animal, is capable of propagating the malady. A similar inference may be arrived at in respect of the secretions and excretions from the abdominal viscera. It is, therefore, to, the secretions of the mouth, or to those issuing from this outlet, that we must exclusively look, as the vehicles of, or as the actual poison. The saliva has been viewed from the earliest period of medical history as constituting, or as conveying, this poison; and the mode of communicating the malady has been of itself a strong proof this is actually the poison. More recently M. TROLLET has contended, that the saliva possesses no contagious properties, unless it becomes mixed with the frothy matter which is driven out from the bronchi, this latter matter constituting the poison or virus which produces the disease. He rests his opinion upon the absence of any evidence of disease, of enlargement, of inflammation, or of congestion, of the salivary glands, upon the morbid changes always existing in the bronchi of the rabid animal, and upon the analogies furnished by other contagious maladies.*—

* As this is a topic of the utmost interest to pathologists, and as the lungs were never viewed, before the researches of M. TROLLET, as the chief seat (although the consecutive seat only, in my opinion,) of morbid appearances in cases of rabies, and as furnishing the poison, the developed effects of which human science has hitherto failed to remove, I here adduce the conclusions at which he arrives:—1st. "The organs of respiration, and the vascular system in the brain, present constant marks of derangement in rabies. The other organs offer nothing that can be rigorously attributed to this malady.—2d. The salivary glands, and the cellular tissue enveloping them, present not the least vestige of inflammation, nor any change in their volume, nor in their colour or texture.—3d. The mucous membrane of the mouth and pharynx are of a pale grey, and are lubricated by a slight moisture: these cavities contain no saliva, nor any frothy matter.—4th. The larynx is rarely inflamed, the trachea more frequently, especially in its inferior portion; the bronchi always. In rabies, the capillaries of the lungs are injected; and this organ is red and congested. The sensibility of this viscus is also greatly increased; a burning heat, pain, and constriction are experienced—pathognomonic signs of inflammatory action.—5th. This inflammatory state of the lungs is specific, and arises from the virus of rabies, as the eruption from the virus of small pox; the inflammatory appearances being present in different degrees, in different subjects. These appearances are seated in the mucous membrane of the bronchi and trachea; the cellular tissue and serous covering of the lungs being not affected.—6th. A frothy mucus is generally found in the parts inflamed; sometimes in the larynx, oftener in the trachea, towards its lower portion; it is generally found in the bronchi, and it may be squeezed from the air-cells. This frothy matter is a product of the inflamed mucous membrane, and is driven over the lips of the rabid person in the last stage of the disease, when the respiration is quick, forcible, and stertorous.—7th. I consider this frothy matter, thus driven, by the spasmodic expirations, from the air passages over the lips to be the true vehicle of the virus of rabies, and not the saliva; because the salivary apparatus is not the seat of any pain during the disease, and does not present any lesion after death; because the bronchi are inflamed, are the seat of pain, and furnish a diseased secretion; and because, in all contagious diseases, the virus is produced from the part inflamed; as in gonorrhoea, small-pox, &c. The saliva, therefore, is no more the

—Although I consider M. TROLLET's opinion to be deserving due consideration in all our future investigations, still it cannot be altogether admitted that he has proved the saliva, unmixed with other fluids, to be devoid of the poisonous property, or that he has demonstrated this property to be present in the secretions of the bronchial mucous membrane. Nevertheless, his investigations and his views are deserving attention, far beyond what they have hitherto received in this country.

45. (b.) *As to the mode in which the rabid virus acts in producing its effects*, we know nothing more than of the operation of other animal poisons, and perhaps even less. The oldest opinion, as to the action of the virus, after being received into a wound, was that it is absorbed and mixed with the circulating fluids, and that it thus produces a general infection of the humours and solids of the body. A subsequent theory ascribed its action to the effects produced in the place injured, and the propagation of this lesion through the whole nervous system. That the fluids and secretions are, generally, infected by this poison is disproven by experiments and observation; and the local effects of the injury bear no proportion to the subsequent constitutional disorder, so as to furnish an argument in favour of the opinion, that the disease arises from the propagation of the local impression throughout the rest of the system. It has already been stated, that the virus does not act by absorption, because the lymphatics and glands betray no signs of irritation, and because the bloodvessels also present no lesion. It has been supposed, that the change locally produced is propagated to the nervous system generally: but granting that this is the case, we are still at a loss to explain the production of a contagious principle, and the limitation of the production of it to a particular part and to a particular secretion. We may, however, readily conceive, that the virus affects or irritates the nerves in the part injured, and that this local change in the nerves is propagated, by means of the sensory nerves, to the medulla oblongata, or to parts in its vicinity, to which they are more especially related; that the morbid condition or change thus produced, is reflected by means of the nerves arising in these parts of the cerebro-spinal axis, to the respiratory and gastric organs, and more especially by the pneumogastric nerves; and that, in consequence of the change in the influence transmitted by these nerves, the circulation, secretions, and functions generally of these organs are altered.—As to the source of the contagious virus, the evidence is inconclusive, although it cannot be doubted, that the secretions which are excreted from the mouth actually contain this poison, and that the formation of it takes place at that period of the disease when the functions of those organs, supplied by the pneumogastric nerves, present more or less disturbance. That the succession of changes just stated is followed by the formation of a specific poison—of a secretion capable of perpetuating the malady—is extremely probable; but the exact source or seat of its formation has not been demonstrated satisfactorily. The poison is evidently contained in the fluids issuing from the mouth;

vehicle of the virus of rabies, than the semen is that of the virus of syphilis."



but whether it is present in the saliva, or in the mucus secreted by the respiratory passages, as contended for by M. TROLLIET, or in the mucus secreted by the mucous follicles of the mouth, or more or less in all these, is very far from having been determined. Supposing that the poison emanates from one or other of these sources, it still remains to enquire, Does the poison consist in a material, organised, or chemical change in the secretion constituting the virus; or is the secretion merely the vehicle of a nervous aura or emanation, which is actually the infecting agent, and which is retained by its vehicle only for a short period? If this latter alternative be admitted; and if it follow, that the infecting influence is powerful in proportion to the exposure of the injured part to the mouth and teeth of the animal inflicting the injury, and is lost soon after removal of the secretion from its source, several phenomena connected with the propagation of the malady may be thereby explained. HERTWIG's experiments, however, prove the former of these alternatives, namely, that the poison is of a definite character, that it may impregnate various substances, and that it retains its activity for a long period. Possessed of these characters, the circumstance of rabies appearing without the injury or contagion being traced, in rare instances, cannot be a matter of surprise.

46. VIII. PATHOLOGICAL INFERENCES AND REMARKS.—(a.) The *spontaneous occurrence of rabies* in man, although believed in by some, and supported by two or three instances loosely detailed and suggesting numerous doubts, rests on no foundation of a satisfactory kind: the fear of water and the nervous symptoms present in some instances of other diseases, furnishing no approximation in character to this dreadful malady.—(b.) The *spontaneous origin of rabies in the dog, wolf, fox, or cat* is a much rarer occurrence than many believe (§§ 38, 39.). I have stated my reasons for this inference. ZIEGLER, however, assigns such an occurrence to the want of the instinctive degree of nourishment from flesh and blood by these animals, and terms the malady, *blood-thirstiness, blut-durst, or flesh-craving, fleischgier*.—(c.) The *saliva or secretion issuing from the mouth* of the rabid animal conveys or constitutes the poison usually inoculating rabies. HERTWIG's experiments show that its application to an open wound is not indispensable to the manifestation of its effects, and that it may infect a healthy animal when applied to parts with a thin epidermis, even without abrasion. He further states that it is inert when applied to the uninjured villous surface of the stomach; but, in opposition to MAGENDIE (§ 40.), he considers that his experiments with inoculation prove the blood of the rabid animal to be contagious.—(d.) The *time of the development of the malady*, after the inoculation of the virus, varies with the corporeal and mental influences, dose of the poison, &c., from seven or eight days to seven or nine months, — usually from four to sixteen weeks. But there are cases on record, which are well authenticated, of years having elapsed from the infliction of the injury until the development of the malady.—(e.) When the disease is developed, the *pathognomonic symptoms*, in man, are the severe constriction about the throat, and spasmodic action of the diaphragm, with general spasm or con-

vulsion, upon attempts to take any fluid, and subsequently at the sight of water, or of any glittering object, or the least breath or current of air, or the slightest touch of the surface*; the tenacious and clammy state of the saliva; and the frenzied or rabid paroxysms, which become more frequent and marked with the progress of the malady. This frenzied or rabid state is not continuous, or at all resembles delirium. It is present only during the impulsive or rabid paroxysm, and ceases during the intervals; although attended, towards the close of the malady, in some cases, by certain illusions of sight, it is not accompanied by any mental delusion.† It may be denominated a momentary state of phrenzy or madness; but it is neither insanity, nor mania, nor delirium.—(f.) According to the observation of several writers, all the *premonitory*, and many of the *advanced, symptoms of rabies appear*, after the bite of a rabid animal, and either *suddenly or gradually disappear*.‡ It is difficult to assign this occurrence to its true cause, or to any single circumstance. The symptoms in these cases may have been developed entirely by the influence of the mind, and have suddenly subsided, or gradually worn themselves out; or the dose of the poison may not have been sufficient for the full development of the malady; or the disease may actually admit of a sudden or gradual

* Dr. ELLIOTSON, whose description is remarkably accurate, justly states that the effect produced by these causes very much resembles that produced upon stepping into a cold bath. A sudden and involuntary inspiration is made, followed by several shorter ones; "and, in cases of hydrophobia, the muscles of the throat are, at the same time, violently contracted, so that the glottis violently closes, and the attempts of the diaphragm to descend, and of the muscles of the chest to elevate the ribs, are frustrated from moment to moment. The closure of the glottis is, however, not continuous, but alternates with relaxation of the muscles, so that a succession of sobs takes place."

† CHELIUS says that there is often an uncontrollable disposition to bite. Mr. SOUTH doubts the truth of this, as regards the human subject. I have, however, seen it in two instances; and it is also mentioned as being observed by POWELL and MAGENDIE. According to my own observations, the disposition in man is rather to strike, during the rabid paroxysm, and only to bite when he is restrained forcibly at that period. The remark of Mr. H. CLINE, that animals afflicted with this disease are invariably disposed to use their organs of defence, — the dog and wolf to bite; the horse to kick and bite, &c., appears quite just. In the cases in which I have observed the rabid paroxysm attended by an impulse to violence, the impulse was momentary, uncontrollable by the patient, and was always regretted and apologised for during the intervals. In all the male cases I have seen, there were almost constant erections, and furious disposition for sexual connection, especially during the rabid paroxysm — a symptom evidently connected with the seat and nature of the lesion of the cerebro-spinal axis produced in the progress of the malady.

‡ Dr. ELLIOTSON thinks it possible, that the symptoms may proceed no further than the precursory, and that the disease may go off; and he instances the cases of two girls, who were bitten in the face by the same dog. "She who was bitten the second became hydrophobic, and died. The other, at exactly the same time, experienced the same premonitory symptoms as her sister, but they all went off." Dr. MEAD remarks, that it will not seem strange "that a poison so different in its force and so alterable by many circumstances, should in some subjects produce symptoms of the same convulsive kind, yet not to such a degree as to hinder deglutition, and these, too, only at particular times. A soldier, of a strong habit of body, came to me, who once a month was seized with a great anxiety, palpitation of the heart, and difficulty of breathing. He had been bitten by a mad dog about six weeks before he began to complain. By bleeding, cold bathing, the powder of lichen with pepper, and volatile medicines, during the oppression, the fits were every month less violent, and at last quite left him" (p. 151.).

arrest under the influence of vital resistance or of medicinal agents. But the occurrences in question are remarkably rare.—(g.) The duration of the disease, when distinctly formed, generally varies from somewhat less than seventy-four hours to six or seven days. The duration has not been observed to depend upon age, nor even upon strength of constitution. The greater number of cases, however, terminate on the second, third, and fourth days, and sink either very suddenly, or rapidly, and often unexpectedly.—(h.) In the dog and other lower animals the dread of water is not observed, nor is it a sign of rabies. As the dog, in the early stage of the disease, has a disposition to lick the hands, face, &c. of persons, this should never be allowed, as I have seen, in several instances, the greatest anxiety and misery experienced for many months by persons who have permitted this filthy and dangerous habit, owing to the circumstance of rabies having appeared in the animal thus indulged.*—(i.) The

poison of rabies affects primarily and especially the nerves of the part, and extends with various grades of rapidity to the medulla oblongata and origins of the pneumogastric nerves, and then the characteristic symptoms of rabies appear; the whole nervous system ultimately becoming more or less implicated, and the secretions and blood very manifestly changed.—(k.) The pathognomonic symptoms and changes observed in rabies more immediately depend upon the lesion of the *medulla oblongata* and *pneumogastric nerves*; but how such lesion gives rise to the formation of a specific poison, capable of perpetuating itself, does not appear, nor can the mode of production of this poison be shown: in this respect, rabies does not differ from other specifically infectious maladies.—(l.) The supposition, lately published, that there is no such specific disease as rabies, and that it is merely the result of mental anxiety, &c. is only one of the absurdities thrown up on the surface of medical doctrine, and hardly deserves mention, and much less serious refutation.

* Having given above (§ 17, 18.) some account of the symptoms of rabies in the dog, much abridged from the description of Mr. YOUATT, I here add that furnished by HERTWIG and CHELIUS.—(a.) In the *furious form of madness*, the dog evinces a change from its usual manner, uneasiness, and disposition to change its bed or place of residence, with a desire of licking cold substances. There is loss of appetite, especially for firm food; and disposition to devour straw, wool, leather, sticks, &c. It licks up not only its own, but also other dogs' urine; and sometimes it eats its own dung. It is obstinately costive, evinces a disposition to bite, especially when excited or threatened, and snaps in the air, as if it would catch flies. There is more particularly a peculiar change in the voice and bark; the voice is hoarse, peevish, and uneasy-sounding; the bark is always followed by a peculiar howl. About the second or third day the eyes become reddened; the skin on the forehead is drawn into wrinkles, giving the animal a fretful appearance; and afterwards the eyes become dull and languid. Mr. YOUATT remarks, that the glands concerned in the secretion of saliva become increased in bulk and vascularity. There is at first an increased secretion of saliva; but it soon lessens in quantity, becomes thicker, viscid, adhesive, and glutinous; and it adheres to the corners of the mouth, fauces, and teeth. The dog furiously attempts to detach the saliva with its paws; and if, after a while, it loses its balance in these attempts and tumbles over there can no longer be any mistake. This is an early symptom; and is owing to the saliva becoming more and more glutinous, irritating the fauces, and threatening suffocation. Mr. YOUATT insists upon the alteration of the sounds uttered by the dog. In every case in which this animal utters any sound during the disease, there is a manifest change of voice which is characteristic. It is generally standing, or occasionally sitting, when the singular sound is uttered. Its muzzle is always elevated. The sound is, at the commencement, a perfect bark, ending abruptly in a singular howl. In some cases this dismal bark and howl is absent, but there is instead a hoarse inward bark, with a characteristic elevation of tone; or there are two or three distinct barks, followed by the peculiar one followed by the howl.

(b.) In *dumb madness*, the dog changes its manner, becomes less lively and watchful, more quiet and melancholy. The lower jaw drops as if paralysed. The saliva flows down to the ground; and every thing, even fluid, which the animal wishes to swallow, drops from its mouth. It can, therefore, bite but little, as the inclination to bite, to run, or even to restlessness, is diminished. All the other symptoms resemble those of furious madness. In the great majority of both furious and dumb madness, there is an evident affection of the lumbar portion of the spinal cord. There is a staggering gait, referable to the hind quarters, and indicating an affection of the lumbar motor nerves. In a few cases it approaches a general paralytic affection. Mr. YOUATT observes, that absence of pain in the bitten part is an almost invariable accompaniment of rabies. The dog will gnaw the flesh completely away from the part. Is this owing to the itching of the part? "However severely a mad dog is beaten, a cry is never forced from it."

(c.) *Diagnosis*.—Care should be taken to distinguish pain in the ear in common canker from rabies in the

47. IX. TREATMENT.—The treatment of the bite of a rabid animal is *first* to prevent the imbibition or morbid impression of the rabid virus, assuming that inoculation of it has followed, and the consequent infection, or contamination, and other changes; and *secondly* to use reasonable endeavours to arrest the malady, or to ward off death, when the symptoms declare themselves. Although a small proportion of those who are bitten by rabid animals may be ultimately seized by the malady, especially when the bites have been inflicted through the clothes, precautionary measures should be taken, nevertheless, in order to prevent the distressing and, it may be said, the incurable effects contingent on these injuries.

48. i. PROPHYLACTIC TREATMENT.—The preventive measures usually had recourse to have generally been employed with the *intention* either of preventing the imbibition or contaminating impression of the poison, by removing or destroying the injured parts, or of fortifying the system against, or of counteracting, the influence of the poison. The former of these intentions are most to be relied upon, for we have no proof of any substance being possessed of the power of counteracting the poison when it has infected the frame, although numerous substances have been supposed to possess this property, owing to the non-appearance of the malady after inoculation of the virus was inferred. But, in many instances, the disease has not appeared, even after manifest proofs of inoculation, and when no prophylactic measures have been resorted to. Most of the means which have been advised as efficacious in counteracting, or in en-

dog. The ear is, oftener than any other part, bitten by the rabid dog; and when the wound in the ear becomes painful, the dog rubs its ear against every projecting body, scratches it, and tumbles over and over while thus employed. Canker, both internal and external, is a disease of slow growth. The length of time that the animal has thus suffered, will usually be a sufficient guide. The dog will often scratch violently enough when it has canker; but will not roll over and over like a football, except it is rabid. The presence of inflammation and ulceration of the internal membrane of the ear in the former, and hardly at all in the latter, notwithstanding the scratching, are deserving of remark. Mr. YOUATT states that he has never seen a case of rabies in the dog in less than fourteen days after the bite. The average time he considers to be five or six weeks. In three months he considers the animal tolerably safe. He, however, met with one case after five months, and another after seven months.

abling the system to resist successfully, the operation of the poison, have likewise been employed in various states of combination, or in different modes, when the effects of the poison begin to appear; but however successful they may have proved as prophylactics—doubtful at the best—they have very rarely or never been efficacious when the malady has declared itself. In noticing *the preventive measures* which have been recommended, I shall take them *in that order which the period at which they may be resorted to will suggest*; those means which may be employed the latest, or in the advanced progress of incubation, being often appropriate, in various associations, when the precursory symptoms appear, if they have not been prescribed previously, and their inefficiency been thereby proved.

49. (a.) *Ligatures or cupping-glasses* may be instantly employed, when a recourse to either is possible, until other measures may be adopted, especially excision, escharotics, &c. *Ligatures* have been advised by PERCIVAL and others, and they ought to be instantly applied, immediately above the seat of injury when this can be done. Where they cannot be applied, *cupping-glasses*, as recommended by CÆLUS, and recently by Sir D. BARRY, may be resorted to, the glass being placed so as equally to surround the bitten part. In emergencies of this nature, any glass, or even deep cup, may be thus applied, with the aid of a piece of burning paper, especially after having been dipped in any spirit. Neither ligatures, nor cupping-glasses, however, should be trusted to longer than either excision or escharotics may be employed by a competent person.

49. (b.) *The complete excision of the injured part* has been next advised; and even amputation of the part, as recommended by Mr. S. COOPER, may be resorted to, when a finger or limb has been severely injured or lacerated, or when complete excision of the parts is almost impossible or dangerous. Mr. YOUATT, whose experience attaches great importance to his advice, remarks respecting this operation, that it demands greater skill than is supposed; and that every portion of the wound with which the tooth could possibly come in contact must be removed. This is often exceedingly difficult owing to the situation and direction of the wound. The knife must not enter the wound, or it will be likely itself to be empoisoned, and then the mischief will be increased. Dr. MASSEY was convinced of this risk, when he advised that, “should the knife by chance enter the wound made by the dog’s tooth, the operation should be recommenced with a clean knife, otherwise the sound parts will become inoculated.” There is no doubt of this risk; and to this cause, as well as to the passage of blood into the bitten wound, to the contamination thereby caused, and to the communication of the contaminated blood with the excised surface, the occurrence of the malady, by no means rare, in cases of excision, is chiefly to be imputed. Aware of the risk arising out of excision unless completely accomplished without incurring it, many practitioners use the caustic after the knife. Nevertheless SAUVAGES, SABATIER, CHELIUS, SOUTH, and many others, trust chiefly to excision, and consider the objections just stated insufficient to cause the relinquishment of the practice. Mr. SOUTH remarks that, when the disease appears after excision, it is because all the infected

part has not been removed. As a portion of the poison may remain, or be dried, upon the cutaneous surface immediately surrounding the bitten part, I would advise ablution of this part of the surface, with a caustic or alkaline solution, just before excision is performed; and that the recommendation of Mr. H. CLINE to thrust a probe to the deepest part of the injury, and to remove all the soft parts around the probe, without cutting into the wound, so that they may be brought out like a glove-finger on the probe, should be adopted. The subsequent free application of caustic potash, of nitric acid, or of the nitrate of silver, is also advisable, in order to destroy whatever poison may still remain, owing either to the penetration of the knife into the contaminated parts, or to the poisoned part having been not entirely removed.

50. (e.) CHELIUS states that, when complete excision cannot be done, the *quick cleansing of the wound and its entire vicinity* with water, salt-water, water and vinegar, &c., should not be neglected; and that, when the wound is small, it should be enlarged, and bleeding promoted by cupping-glasses or warm water. The whole he recommends to be thoroughly *cauterised* by the actual cautery, butter of antimony, caustic ammonia, or caustic potash, or with gun-powder, which is to be exploded. He adds that the slough is to be soon removed, and a free suppuration is to be kept up for months, by scattering powdered cantharides, and by irritating salves. He further advises mercury to be rubbed in around the wound until ptyalism is produced. The same treatment is prescribed by him if the wound, already closed, begins to smart and swell. CHELIUS here judiciously associates various measures which have singly found strenuous supporters.

51. (f.) Mr. YOUATT recommends, as an *escharotic*, the nitrate of silver, as it may be shaped into so sharp a form as to penetrate as far as the tooth of the animal can have reached, and as it forms a dry eschar. The danger which he attributes to the alkaline caustics, and to nitric acid, of suspending the virus, &c., I believe not to be justly dreaded; for these, in their caustic state, may be considered as capable of destroying the poison, and as completely, as the nitrate of silver possibly can. Of the several substances recommended as escharotics little need be said. The one is probably as efficacious as the other; that one, which, with efficiency, may be most promptly procured, being always preferable.—α. Mr. YOUATT, as just stated, prefers the *nitrate of silver*, and adduces the successful employment of it in hundreds of cases, in support of his opinion.—β. ECKER, FERRIAR, PINEL, RUBIÈRA, MARTINET, SOUTH, and others, advise the *caustic alkalies*, either the fixed or volatile.—γ. MEINHARD, AGRICOLA, MALDEN, FLAJANI, and numerous more recent writers, recommend the *hydro-chloric or nitric acid*, or the *sulphuric* or other concentrated acids.—δ. The application of *butter of antimony* to the part, after enlarging the wound, has found advocates in SABATIER, PINEL and LE ROUX; and a similar application of *arsenic* or of *arsenical paste*, has been prescribed by AGRICOLA, ZINCKE, ROUGEMONT, HABLES, and others.—ε. FABRICIUS HILDANUS, and GÖCKEL, advise *boiling oil* to be poured into the enlarged wound, so that it may reach the bottom, and produce a large eschar, followed by free suppuration.—ζ. VALENTIN recommends

ustion of the part, even after several days, by means of the bark of the *fraxinus* burnt in the wound.—7. Recourse to the *actual cautery* has been long and generally had; but it cannot be considered efficacious unless early employed, and unless it reach the bottom of the wound.

52. (g.) After a satisfactory employment of the actual or of the potential cautery, *suppuration of the wound*, kept up for several weeks, according to some, or even for months, according to others, has found numerous supporters; very different means having been used with this intention. CELSUS, GALEN, FABRICIUS HILDANUS, SCHLEGEL, SCHMUCKER, BALDINGER, &c., attach much importance to this measure, whilst GEISELER, PLANK, O'DONNELL, and the FRANKS, believe it to be useless. The means which have been most commonly employed for this purpose are powdered *cantharides*; or the powder of the *melœ proscarabæus*, or *scarabæus majalis* (KEMME, FRITSCH, MÜLLER, HANNOVER, &c.), *savine*, the diluted *acids*, and strong brine, or a solution of *common salt* (DU HAMEL, PAULLINI, AWSITER, &c.). Dr. BENNETT states, that AXTER, of Vienna, applies a *blister* over the wound, and afterwards dresses it with powdered *lyttæ*, or some stimulating lotion, for six weeks; that he gives also a grain of powdered *lyttæ* and six grains of *cancrorum oculi* internally for six days; and that, “during a period of twenty-seven years, no patient thus treated had been brought back to the hospital under this disease.” Dr. HAUSBRAND employs general *bleeding*, and makes deep *scarifications* of the wound, which he washes with *salt and water*, after favouring the flow of blood as much as possible. He then applies an ointment of *unguent. basilicum*, and *pulv. lyttæ*, and keeps up a discharge for three months. He also gives *camphor* and *opium* internally, during the first three days. “Eleven persons bitten by dogs actually rabid escaped after this treatment.” Dr. WENDT, besides keeping up, for six weeks, *suppuration* of the wound by means of *pulv. lyttæ*, or other irritating applications, employs *mercury* internally so as to produce salivation. Of 180 persons thus treated in the Breslau hospital, of whom half had been bitten by dogs actually rabid, or supposed to be so, only two died. The German physicians generally confide in *prolonged suppuration of the wound*: but Mr. YOWATT, who has employed the *lunar caustic*, having previously enlarged the wound, when this is necessary, to upwards of 400 persons, and four times on himself after bites from dogs decidedly rabid, has not seen the disease appear in one instance.

53. A. The foregoing measures are those which have been most confided in when adopted immediately or soon after the infliction of the injury. But they have likewise been resorted to during the *latent period*, or at a time more or less remote from the receipt of injury; and various additional means have also been prescribed as prophylactics during this period. Dr. A. T. THOMSON supposes that the virus remains latent in the wound during this period, and produces no marked effect until the state of the constitution favours its action; and hence he infers that *excision* and other *local measures* may be useful at any time before the precursory symptoms appear. Several facts have been adduced tending to show that this opinion is deserving of attention. RUSH has related a case

in which “excision was performed thirty-one days after the bite, and even after the hydrophobic symptoms had appeared, and the patient’s life was saved.” Dr. HARDER relates a case (*Petersburg Med. Trans.* vol. i. p. 170.), in which hydrophobia supervened five months after the bite, and eight weeks after excision; but another excision and cauterisation then saved the child. In two weeks the symptoms returned, and a pale and painful excrescence formed in the bottom of the wound. This was excised, and the wound cauterised by nitrate of silver, and recovery took place. Dr. BENNETT states that M. RECAMIER opened the cicatrices which were tumefied in a person who had been bitten by a rabid animal fifteen days before, and cauterised them with the crystallised *nitrate of mercury*. Baths and diaphoretics were also employed, and the patient escaped the malady; although another person who had been bitten by the same animal, at the same time, perished of rabies. These cases fully warrant excision and the cautery at any period, even up to the time of the manifestation of the disease, and especially when pain, swelling, itching, or discoloration of the cicatrix appears. At this period more particularly, Dr. SCHÆFFER recommends the nerves going to the part to be divided.

54. (a.) Dr. MAROCHETTI, who considers that small pustules form under the tongue during the latent or incubative period (§ 7. Note.), contends that the true preventive measures consist of *opening and cauterising these pustules*, within twenty-four hours after their formation, of washing the mouth with a decoction of the *genista tinctoria*, and of the patient’s drinking a pint and a half of this decoction, daily, for six weeks. SALVATORI and ROSSI have been said to have succeeded in some cases, in which these means were adopted; but M. MACISTEL states that, of ten cases in which he employed them, five died; although more might have been affected if nothing had been done.

55. (b.) During the latent period numerous other means have been advised, in order to counteract the operation of the poison, or to enable the constitution to resist its influence. Many of these means have been recommended with more or less rational intentions, whilst others have been employed empirically. Of those, which have been advised with the former of these intentions, some have been suggested with the view of exciting certain emunctories, and thereby preventing changes affecting the constitution of the blood from taking place; and others have been prescribed with a view of supporting the vital powers, and thereby resisting the action of the virus, and of accomplishing other contingent intentions. Some of these means are both local and constitutional, and others are employed either externally or internally only.

56. (c.) Powdered *cantharides*, both locally and internally, have been recommended by WERLHOFF, ALIX, WICHMANN, VOGEL, CATANI, SCARAMUCCI, and ROUGEMONT, for some time after the bite, and even when signs of irritation appear in the cicatrix; and STAHL and others advise that the use of this substance should be persisted in until the urinary organs are affected, or until bloody urine is produced,—a recommendation to which AVICENNA attached importance in respect of the employment of other active diuretics in this malady. The *melœ proscarabæus* was similarly

prescribed by SENNERT, SCHRÖDER, REIDLIN, and others, both immediately after the injury, and during the latent period.

57. (d.) *Chlorine, chloric, and hydrochloric acid*, have been much used both locally and internally, to dis-infect the wound and to resist the influence of the virus on the frame. MALDEN, AGRICOLA, MEINHARD, and SEMMOLA, have attached much importance to these substances; but several instances have been recorded of the appearance of the malady notwithstanding a prolonged recourse to them. *Arsenical preparations* have likewise been employed in the latent period, both locally and internally, and continued for a considerable time, or according to the quantity prescribed and its effects. HARLES, and others already mentioned, appear to have attached some importance to their use. An infusion of *rue* in *acetic acid*, or the *acetum rutæ*, has been employed both locally and internally by WEDEL and others, and continued for several weeks after the injury; the *theriaca* being also taken for a considerable time.

58. (e.) There are few preparations whose local or external and internal use have been more frequently recommended than the *mercurial*. The *bi-chloride*, the *chloride*, and the *ointments*, have been severally employed both locally or externally, and internally, in the course of the latent period; and even when the precursory symptoms have appeared — and not only singly, but also in various quantities and combinations. The application of the *sublimate* to the wound was first prescribed by FABRICIUS HILDANUS and PALMARIUS; and, more recently, WEDEKIND, PERCY, and numerous writers in the Memoirs of the Royal Academy of Medicine of Paris for the years 1777, 1778, 1782, and 1783, advised its use, both locally and internally, as a prophylactic. *Calomel* was employed with *sulphuret of antimony*, *camphor*, and various other substances by RANBY, WESTALL, and others, and given in large and frequent doses until the mercurial action appeared. The strong *mercurial ointment* was applied to the wound also externally by *friction*, conjoined with *camphor*, by BAUDOT, DESAULT, HANNOVER, POSTAL, and others, and whilst this application was made to the wound PERCIVAL recommended *cinchona* and *wine* to be taken, in order to promote the nervous energy and the vital resistance of the constitution to the poison. Mercurial frictions, the ointment being mixed with *camphor* and *musk*, were directed over the parotid glands by SCHRÖDER and SAULGIER; and continued until salivation followed. Whether used internally or externally, or in any of the combinations just mentioned, or in any other, HOLDEFREUND, COLOMBIER, FALCONER, and many others, advised the preparations of mercury to be persisted in until salivation was produced, and to be continued for a considerable time.

59. (f.) *Frictions with olive oil*, whilst this oil is taken internally so as to preserve a regular state of the secretions and excretions, were recommended by SHADWELL, SIMS, and FOTHERGILL, and to be continued for a long time after the injury. BAUDOT and others advised that the frictions should be made with a combination of the oil with mercurial ointment and *camphor*; and MEASE and LOFTIE with olive oil and the *oleum succini*. WATT recommended a seton to be introduced into the nape of the neck, and the dis-

charge from it to be freely promoted — a suggestion by no means undeserving of adoption, considering the very remarkable changes generally found in the medulla oblongata and its membranes after death, and which the seton may prevent by the revulsive irritation produced by it.

60. (f.) *Baths, cold, warm, and medicated*, salt-water baths, the cold affusion, &c., have severally been mentioned by writers, from CELSUS downwards; but they are of doubtful service. Cold salt water bathing, and shower baths seem most appropriate, as tending to diminish susceptibility and to invigorate the frame; but I am unacquainted with any satisfactory proofs of their efficacy.

61. (g.) Numerous *stimulants, antispasmodics, and tonics* have been advised, with the intention of enabling the nervous system to resist the operation of the rabid virus. *Musk*, in various combinations, and more especially with opium, has been employed by several writers; and *opium* in numerous forms of association have been prescribed by many authors. *Myrrh*, with opium, &c., was recommended by SCHLEGEL; *serpentaria* with the wine of *absinthium*, by VALENTINI; the infusion or decoction of the leaves of the *taxus baccata*, internally and externally, by ROUGE-MONT, RÖMER, and HILDEBRAND; the decoction of *rue* with that of the *taxus baccata* by BLAINE; the powder, or infusion, or the oil of *valerian*, by BOUTEILLE and others; *ammonia* and its various preparations, in large doses, and in various combinations, as with the *anagallis purpurea*, the *oleum* or *spiritus succini*, &c. by ANDRY, RAVENSTEIN, and others; *assafœtida* with *camphor*, *musk*, and opium by SCHMUCKER, ALIX, and NUGENT; the powder or extract of *nux vomica* by SCHULZE and ROUGE-MONT; *phosphorus* in æther by ZINCKE; and *cinchona*, *wine*, *aromatics*, and various tonics, by MEASE, LOFTIE, and numerous other writers. The *anagallis flore purpureo* was praised by KÆMPF, ANDRY, and RAVENSTEIN, was given in doses of a scruple, every sixth hour, and was prescribed with *ammonia* by some, and both externally and internally by others; but RAYMOND and other writers state that it is inefficacious.

62. (h.) Several *anodyne, narcotic, and sedative* substances have also been tried — during the latent period, with the hope of thereby preventing the development of the malady; but with no evidence of even such partial success as may hereafter warrant recourse to any of them. These substances, as well as those belonging to the preceding category, were seldom prescribed alone, but were generally conjoined with other internal or external means. Thus *stramonium* was prescribed internally by HARLES, with laurel water, and *belladonna*, by HANNOVER, MUNCH, and HENNING, whilst suppuration of the wounds was promoted.

63. (i.) It is unnecessary to pursue further the history of means employed in order to prevent the development of the malady after inoculation of its virus is either feared or presumed. An impartial view of all the circumstances involved in cases of injury by rabid animals, discloses various fallacies which weaken the evidence of success which has been imputed to many substances which have been employed as prophylactics; and, whilst some have been insufficiently tried, and their in-

efficacy hence not demonstrated, others have been found to fail, upon the success of which much reliance had been previously placed. But it may be asked, should these latter be discarded altogether, or should the facts stated in their favour be discredited because they have been found to fail in one, two, or even in a few instances? The answer I would suggest is, that they ought not to be discarded unless in favour of means which promise a more certain success; for if they be relinquished for these reasons, then with equal reason should all diseases be left to the unaided efforts of nature, inasmuch as no unvarying plan of cure, or no single remedy is efficacious in all cases of any specific malady; and, as regards the prevention of rabies, means which often have proved efficacious in respect of some states of constitution, or against certain grades of infection may nevertheless fail in other circumstances, either of constitution or of inoculation.

64. ii. CURATIVE TREATMENT? — However doubtful, or even hopeless, the success to be derived from treatment when the malady has declared itself, nevertheless the attempt to cure the patient should be rationally made. Instances of recovery from the developed disease are so few as to induce many to believe that they were not really cases of this disease, but of some other affection, in which dread of water was a prominent symptom. Nevertheless, in a few cases of recovery — certainly very few — the evidence as to the actual existence of true rabies admits not of doubt. — (a.) In most, if not in all of these, *blood-letting*, carried to the utmost extent, was the remedy to which recovery was chiefly imputed — a treatment advised by BOERHAAVE, MEAD, FOTHERGILL, FERRIAR, MEASE, NUGENT, HARTLEY, RUSH, WOLLASTON, and others. I have referred to the published cases by HARTLEY, PETERS, INNES, TYMON, BURTON, SHOOLBRED, WYNNE, VOGELSANG, and DU HEAUME, in which very copious blood-letting was employed with success. This treatment has certainly been resorted to by many physicians without success; but I believe that in many instances it has not been carried sufficiently far, or has not been resorted to at an early enough stage of the declared malady. I think that these causes of failure are manifest in the cases detailed by Dr. ALBERS of Bremen, TROLLET, and by others; and that the opinion expressed by Mr. S. COOPER, and by Dr. J. L. BARDSLEY, as to the successful cases not having been instances of true rabies, is not correct, as an attentive perusal of the details of these cases convinces me that they were actually what they professed to be. BERGER, one of the earliest writers who recommended blood-letting, advised that the blood should be taken from the frontal veins; and WEDEL that it ought to be drawn from the sublingual veins. In the vicinity of BRESLAU in 1719, a cow, the subject of rabies, was cured by an enormous venesection. The case of recovery recorded by Dr. BURTON was treated by the abstraction of 122 ounces of blood within four days, and by calomel and opium. In the much earlier instance recorded by Mr. HARTLEY about 120 ounces were taken, and the cold bath frequently resorted to; a similar treatment, with the addition of opiates and sudorifics, having been resorted to successfully by HILLARY. In Mr. TYMON's case, very copious blood-letting was accompanied with large and frequent doses of opium, with calomel, James's

powder, and mercurial inunction. Dr. SHOOLBRED, finding immediate relief to follow a very large venesection, trusted to this agent chiefly. In Dr. DU HEAUME's case profuse blood-letting allayed the fully developed symptoms, and draughts with digitalis, hydrocyanic acid and morphia were given, and a drachm of the strong mercurial ointment was rubbed into his legs night and morning. Dr. VOGELSANG, after insisting upon blood-letting as the remedy alone to be confided in, shows that it should be resorted to as early as the malady declares itself, and that it ought to be carried at first to the greatest length consistent with the immediate safety of the patient. Dr. SHOOLBRED's recommendation is to a similar effect; but he advises that the venesection should be with a large orifice in order that full syncope should follow.

65. It does not appear that the very large doses of opium, the calomel and mercurial ointment, the cold baths, or the diaphoretics prescribed in several of the successful cases in which large blood-lettings were practised, had much to do with the recovery; inasmuch as these means had, on numerous occasions, been employed to a very great extent without any benefit. Probably, however, the mercurials, the consequent salivation, and copious diaphoresis, produced some service, or aided in preventing the recurrence of the rabid paroxysms. That blood-letting is a rational method of treating this malady is not only proved by its recorded success, but also evinced by the inflammatory or congestive changes found after death in the medulla oblongata, lungs and brain (§§ 20 — 23.).

66. B. Other *evacuants*, beside bloodletting, have been employed, but with doubtful results. — (a.) *Emetics* often repeated were recommended by MASSALIEN, ROUGEMONT, SATTERLY, and others; the antimonial emetics conjoined with camphor, musk, &c. being preferred, with the view of producing also free diaphoresis. How far they may be of service I am unable to state; but the occasional imperfect retchings or vomiting, and the state of the alvine evacuations, indicate the propriety of an early recourse to them, or as soon as the hydrophobic period declares itself.

67. (b.) *Purgatives*, after blood-letting and emetics have been resorted to, have been advised by comparatively few writers; but I agree with the few who approve of their exhibition that the cholagogue purgatives are required, more especially calomel, or the corrosive sublimate, or the turbit mineral, aided by purgative enemata. Most of the writers who have advised these latter preparations have entertained the intention of producing *salivation* by them as well as a free evacuation of bile; and have therefore aided this latter operation by the inunction of strong mercurial ointment; and by conjoining them with antimonials, or with camphor, or various other remedies according to the progress which the disease had made. These medicines have been much employed as prophylactics (§ 58.); and when thus resorted to, it is difficult to form a correct estimate of the amount of benefit derived from them; but when the hydrophobic stage has supervened, there is very slight evidence of decided advantage having been derived from them, although, in one or two instances on record, success even in this stage has been imputed to them.

68. (c.) *Profuse diaphoresis* has been said to

have proved successful when early procured and perseveringly promoted. It is most difficult, however, to produce the effect in a sufficient degree by internal medicines, unless they are promoted by the vapour-bath, or by heated air. This practice has nevertheless been sanctioned by GÖCKEL, VATER, WALDSCHMIDT, PAULLINI, HILLARY, RICHTER, and others; but I doubt that it has been employed in so decided a manner as to test sufficiently its effects upon the malady.

69. *C.* The *sedatives*, *narcotics*, and *anodynes*, usually prescribed in medical practice, often have been employed as soon as the hydrophobic symptoms have appeared, but scarcely even with a palliative influence. — (*a.*) Of the several *sedatives* which have been suggested, the *cold affusion*, *prolonged shower-baths*, or *submersion* and *cold baths*, are the most energetic. They have been recommended by RANBY, HARRIS, RUSSEL, WARD, and others, but upon no evidence of their efficacy; whilst FOTHERGILL, DICKSON, WALDSCHMIDT, and many other writers, have considered them worse than useless. The same contradictory opinions have been emitted in respect of *warm*, and variously *medicated*, and *alkaline baths*, which have been advised from theoretical views rather than from any experience of their influence on this malady. In most of the instances, however, in which I find any record of the manner of employing these baths, they appear not to have received a satisfactory trial, and not to have been persisted in, or repeated, so as to produce a copious and prolonged sweat, or to an extent equal to that suggested above (§ 68.). Of other *sedatives* *digitalis*, *hydrocyanic acid*, and the *diate of lead*, are the most deserving of notice. *Digitalis* was suggested by Dr. PERCIVAL, and several instances in which it has been given without any marked effect have been recorded. No advantage can be reasonably expected from it unless it be prescribed promptly, and in nearly poisonous doses. *Hydrocyanic acid* was given by Dr. A. T. THOMSON, but with little or no benefit. The remark just offered respecting *digitalis* is even more applicable to this acid when prescribed for rabies; and if it should ever again be given in the developed malady, I would advise it to be tried in the largest dose compatible with the continuance of life; and to be followed, during its sedative action, by the affusion of cold water over the head and occiput. I may add, that *laurel-water* was recommended with *belladonna* by HECKER and SCHWABISCHER in the developed state of the disease, but it does not appear that the recommendation proceeded from any sufficient experience of advantage from them. The *acetate of lead*, advised by HEGEWISCH, and the *infusion of tobacco*, as an injection, prescribed by Mr. SAWREY, belong to this category, and hitherto no evidence has been produced in their favour.

70. (*b.*) Of *anodynes* and *narcotics*, *opium* and its various preparations and salts—the *acetate* and *muriate of morphia*—have been most employed; but, although severally prescribed in remarkably large and frequently repeated doses—although as much as 200 grains of *opium* have been given within twelve hours, no benefit was derived. Mr. WARD advised opiate frictions, and Dr. BOOTH the injection of a solution of the acetate of morphia into the cephalic vein. This latter measure was practised by Drs. BRANDRETH and BARDSLEY without any advantage. The preparations of *opium* and

of *morphia* have been given in all combinations and forms—with *camphor*, with *musk*, with *myrrh*, with *ammonia*, with *valerian*, &c.—by the mouth and in enemata, but with no benefit when confided in as the chief means of cure, and only with equivocal advantage when prescribed after large bleedings. — *Belladonna* has been recommended not only as a prophylactic, but also as a cure, by MUNCH, HENNING, HANNOVER, and others already mentioned, aided by division of the nerves going to the cicatrix, or by re-opening the cicatrix and procuring a copious discharge from it; and by combining the *belladonna* with the substances just enumerated. But there is no evidence of success having followed a recourse to this medicine. The same remark is equally applicable to *stramonium*, which was suggested by HARLES to be given in laurel water; and *conium* is equally inefficient. More recently the tincture, infusion, or extract of the Indian hemp—*canabis Indica*—has been recommended, but I have not heard of any instance of success from the use of this intoxicating substance. Indeed, when the changes found after death are considered, no advantage can be rationally expected from any one of the *anodynes* or *narcotics*, when trusted in chiefly, or given in excessively large doses. It is extremely probable, that *ether*, *chloroform*, and other substances productive of insensibility when administered by inhalation, will receive an early trial in this malady; but, for the reason just assigned, no sanguine hopes of success from them can be entertained. Nevertheless, “*Anceps remedium melius est quam nullum*,” and the remedies of this class may be productive of some benefit, either when inhaled or taken internally, or when administered externally or locally. The local application also of these *anodynes* may be of use, both in the premonitory stage, and in the advanced course of the malady.

71. *D.* The most powerful *antispasmodics* and *stimulants* have been advised, and often employed, but with no proof of advantage having been derived from any of them. — (*a.*) The *ethers*, *musk*, *camphor*, *ammonia*, *castor*, *assafoetida*, *turpentine*, *valerian*, &c. have severally received satisfactory trials, and their want of efficacy in this malady has been sufficiently demonstrated, both when given alone or in conjunction with other medicines, in which latter form they have been most commonly prescribed, more especially with *opium*, or with *belladonna*, or other *narcotics*, as mentioned by MEASE, BUCHOLZ, NUGENT, and many others. And these medicines have not only been administered by the mouth, but also in enemata, and in various combinations. *Æther* was thus given with *opium* by MEASE; with *phosphorus* by ZINCKE; with the succinated spirit of ammonia, with *camphor*, &c. by several other physicians. *Musk* has been exhibited in similar modes and combinations—with *opium*, *belladonna*, *camphor*, &c.; and with *cinnabar*, *creta*, and *opium*, forming the *pulvis Cobbii* or *Tunguinensis*; but there is no sufficient evidence of its efficacy. In a case which I attended with Mr. DENDY, the spirit of *turpentine* received for the first time a sufficient trial—a trial demonstrative of its want of efficacy in this malady. — (*b.*) *Electricity* and *galvanism* were recommended by ROSSI and ALDINI, but no permanent benefit was derived from them. — The *nitrous oxide gas* was administered by Dr. BARDSLEY with little effect.

72. *E. Tonics* of various kinds have also been tried, but with no marked benefit. *Nux vomica* was given by ROUGEMONT and SCHULZE, and *strychnia* by Dr. BARDSLEY. The *mineral acids*, more especially the *hydrochloric*, have been recommended by MEINHARD, AGRICOLA, MALDEN, ANCELLI, BRUGNATELLI, and others; and, probably after bleeding, the *chlorate of potash*, and the *chloric æther*, are deserving a trial. The *mineral salts*, especially the nitrate of *silver*, the preparations of *zinc*, the muriated tincture and other preparations of *iron*, have likewise been prescribed; the last by Dr. ELLIOTSON, BRIGHT, and others. The several *vegetable tonics*, especially the *cinchona* and *cascarilla* barks, *sulphate of quina*, &c., have also been suggested, variously combined, and aided by other means, as wine, aromatics, antispasmodics, &c.; but, although MEASE, LOFTIE, and others, have conceived that advantage might be derived from this class of medicines, especially when thus associated, or combined with anodynes or narcotics, no satisfactory evidence that benefit has been derived from them, when the disease is developed, has hitherto been furnished. Dr. SEMMOLA has insisted upon the employment of chlorine, both internally and externally, as a prophylactic, and as a means of cure.

73. *F. Diuretics* were recommended for rabies by AVICENNA; but STAHL considered that no advantage could be derived from them unless they are given in so large doses and so frequently as to produce bloody urine; and with this view cantharides and the meloë proscarabæus have been prescribed by numerous writers, even since the empirical reputation of the latter in rabies has been shown to be, like all other nostrums, without any foundation.

74. *G. Tracheotomy* was advised to be performed by Drs. RUSH and PHYSIC in America, and recently by Mr. MAYO, with the view of averting death as long as possible; believing that this issue was more immediately produced by spasm of the laryngeal muscles; but it is doubtful whether or no spasm of these muscles is more concerned in producing this result than spasm, or even than paralysis, of other muscles or parts.

75. *H. M. MAGENDIE*, believing that the fluid parts of the blood were diminished by the inability of the patient to swallow fluids, and by the continued transpiration from the surfaces, injected a pint of water, of the temperature of 30° of REAUMUR, into the veins of a man in an advanced stage of rabies. The patient immediately became tranquil, and his pulse, in twenty minutes, fell from about 150 to 80. The spasms ceased, and he drank a glass of water. He continued to improve until the fifth day, when abscesses, primary and secondary, appeared in consequence of portions of lancets, which had broken during attempts to bleed him in the feet during the paroxysm, having remained in the wounds. He died early on the ninth day.—(*Journ. de Physiol.*, t. iii. p. 386.)

76. In a malady so little under the control of medical treatment as this confessedly is, reliance cannot reasonably be placed on any single remedy; and hence, various means have been often employed, coëtaneously or successively, to arrest its progress, or to combat its more distressing symptoms. Numerous combinations of the medicines noticed above, either as prophylactics or as curative agents, have been advised by writers—but

advised rather as suitable means for trial, than recommended from satisfactory, or even from any, experience of their efficacy.

77. (*a.*) B. D. MAUCHART long ago directed blood-letting from the arm of the side in which the injury was inflicted, and a quantity of blood to be taken great in proportion to the time which had elapsed from the infliction of it. If the patient had become melancholic, or if any of the symptoms of the invasion of the malady existed, he ordered the blood-letting to be carried to the production of full syncope. He next ordered the cicatrix to be scarified and the bleeding from it to be encouraged; afterwards the mithridate, rue, theriaca, &c., to be constantly applied to it; and these and similar substances to be taken internally. He further directed a copious diaphoresis to be kept up, and prescribed the same or similar means both to prevent the malady, and to cure it when it appeared; success having been said to follow this plan even where the disease was fully developed. It would be impossible for me to notice, within reasonable limits, other associated means which have been suggested by authors. The reader will find most of them in the numerous works and papers referred to in the sequel; and he will further observe that substances confidently recommended, either empirically, or by professional credit, as most efficacious remedies in this malady, have after a time altogether lost their reputation, not merely from having been displaced from public or medical favour by newer means, but because they have been found totally inefficacious when employed.

78. (*b.*) The uncertain or fluctuating views as to the pathology of rabies, have tended not only to render equally uncertain the plans and means of treatment, but also to increase the number of substances advised as specifics with the utmost confidence which ignorance imparts to empirical means. As certain contagious maladies have been cured by medicines, viewed as specific means, or such as may be depended upon for the removal of these maladies, so has it been expected that rabies was to be cured by some particular remedy which, if once found out, might be proclaimed as the true panacea. Hence various substances have been, from time to time, thus dignified, and enjoyed a short-lived popularity. At a time when credulity was not limited to a few individuals, but extended to scientific and corporate bodies, or rather when individuals were so generally credulous as to impart this character to the societies which they constituted, certain substances received a reputation from this weakness of the human mind; and at a time when it was most implicitly believed by all physicians from Oxford and Cambridge, but by themselves only, that all learning and knowledge were concentrated in themselves alone, the ash-coloured liverwort was dignified by these physicians with the name of the *Pulvis antilyssus*. Subsequently other empirical remedies have thrown the college nostrum in the shade, and the virus inoculated by the bite of a viper, the guacojuice, the *Scutellaria laterifolia*, the *Alyssa Plantago*, the *Ophiorhiza mungos*, the *Genista tinctoria*, the *Thalictrum flavum* and *angustifolium*, the *Delphinium consolida*, the *Anagallis purpurea*, phosphorated æther or phosphorated water, and numerous other substances, have in different countries, and at successive periods, enjoyed their undeserved and short-lived reputations, and sunk into congenial

oblivion. It may be added, for the information of those who take delight in empirical remedies, that in almost every town, in every country, may be found some old man or old woman, who rejoices himself or herself, or knowingly deceives the neighbours and all the credulous within reach, in all ranks, with the professed possession of a specific against rabies; and that these specifics, according to the amount of patronage conferred upon them, have at different times enjoyed a reputation, which was overturned only after numerous proofs of their want of efficacy. The Ormskirk powder, and the pulvis Tinguinensis are sufficient illustrations of the popular faith in vaunted but worthless specifics, and the credulous confidence they inspired. Numerous recent deceptions, absurdities, and fooleries—deceptions on so large a scale as to comprise the whole range of disease—have thrown these and other absurdities into the shade, and have proved humiliating illustrations of human nature; demonstrative of the extent to which knavish pretension, with a designing sacrifice of human life to selfish acquisition, on the one hand, and credulous patronage on the other, lower the just estimate of moral and intellectual endowment, and sink the general standard of common sense and sagacity, as manifested throughout the community, from the highest places, through all ranks, classes, and grades, down to the lowest sinks of wretchedness.

79. *I. Treatment advised by the Author.*—After the review which I have now taken of the treatment which has been recommended for the cure of rabies in the earlier as well as in the more advanced stages of the developed malady, and reflecting upon what I have myself observed, I may be permitted to state the means, in which I am disposed to place reliance when the disease has declared itself:—*Bleedings* from the arm to syncope, or large *cupplings* on the nape of the neck, repeated, or carried as far as the habit of body, and circumstances of the case will permit, have a greater amount of evidence in their favour, than other remedies, and are moreover more consistent with the lesions observed after death. After bleeding, the nerves proceeding to the cicatrix may be divided, and the cicatrix itself laid freely open, suppuration from it being as speedily and freely produced as possible. Immediately upon opening the cicatrix, &c. a free perspiration should be procured and kept up by a hot-air bath, for which the materials are always at hand—namely, blankets and a lamp,—or by a vapour bath. In other respects the treatment must depend much on circumstances, and on the predominance or urgency of particular symptoms, for which emetics, mercurials, purgatives, enemata, anodynes, narcotics, antispasmodics, stimulants, tonics, &c. may be employed according to the procession and severity of the morbid phenomena.

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RECTUM AND ANUS, DISEASES OF THE.—

CLASSIF.—GENERAL AND SPECIAL PATHOLOGY.

1. Disease is rarely limited to either the one or the other of those parts, but commonly extends to both when originating in either. Affections of the rectum and anus, whether functional or structural, cannot be satisfactorily understood unless the *structure*, *functions*, and *sympathies* of these parts are duly considered.—(a.) As respects *structure*, the fully developed states of the mucous membrane, of the connecting cellular tissue, and of the muscular coats of the intestinal outlet; the numerous mucous follicles with which this part is provided; the connections of the veins of the rectum and

anus with the mesenteric and portal veins, and of the nerves with the ganglial and spinal; the plicated state of the internal surface, admitting of great distention when accumulations of fæces or of flatus take place in the rectum; the folds of mucous membrane, both transverse (*transverse valves*—*rectal valves* of *HOUSTON*) and longitudinal, existing in the internal surface, and the development of these folds during irritation or contraction of the bowel; the liability to congestion of the congeries of veins of the rectum and anus from irritation of the mucous surface, or from interrupted circulation through the mesenteric and portal veins, or from certain positions; the interposition of, and the support furnished by, adipose matter; the various alterations of sensibility, and the numerous sympathies, in which nervous and vascular connections involve the rectum and anus, constitute an assemblage of circumstances, which, individually and collectively, require due consideration in all our investigations into the nature and treatment of the affections to which these parts are liable.

2. (b.) The *functions* of the rectum and anus are not confined merely to the giving exit to the contents of the bowels. The rectum allows, in some degree, the fæces to accumulate within it, until opportunity and the consequent irritation and distension admit of their expulsion; and on frequent occasions, when want or neglect of such opportunity, or mechanical obstruction at the verge of the anus, or a weakened or paralysed state of the muscular coats of the bowel, causes accumulations of fæces and of flatus, remarkable distension, not only of the rectum, but also of the colon, is thereby produced, so that the former fills up a very large space in the pelvic cavity. The rectum, moreover, in connection with the colon, produces more or less of change in the blood circulating to its mucous surface. The numerous follicles with which this surface is studded, actively aid in depurating the blood, and in removing materials, which, if allowed to remain, might act injuriously when carried into the portal and pulmonary circulations, whilst the secretions which they furnish constitute a portion, and facilitate the evacuation, of the intestinal excretions. The rapidity and amount of absorption by the internal surface of the rectum, whether by venous imbibition or by lymphatic absorption, as demonstrated in health and disease, and by the injection of fluids, simple, medicated, or poisoned, are of great importance as respects not merely disease of this bowel, but also the administration of medicinal agents.

3. (c.) The *sympathies* of the rectum and anus are of importance not only as respects the diseases of these parts themselves, but also those of the other divisions of the alimentary canal and of the several associated and related parts, more especially the urinary and generative organs. *Continuity* of surface, membrane and structure; *contiguity* of position, and the mutual support derived therefrom, and from the interposed and surrounding adipose tissue; the *connections* consisting of vascular communications and of nervous distribution,—an abundant distribution of organic or ganglial nerves in connection with the ganglia and plexuses supplying the urinary, generative, and intestinal viscera,—an evident accession of spinal nerves, both sensory and motory, to these nerves and ganglia, and to the structures of the rectum and anus, this

accession becoming more marked and abundant as the anus is approached,—and the muscular apparatus with which the outlets of the intestinal, the urinary and the genital canals are provided, combine to associate various phenomena affecting these parts, and to develop numerous sympathies in disease. A knowledge, or a due recognition, of these sympathies, especially in respect of their sources and relations, very materially assists our researches into the nature and treatment, not only of the affections to which the intestinal outlet is liable, but also of those which implicate the rest of the canal, and which are seated in the urinary and sexual organs. This knowledge, moreover, is often one of the chief aids which we possess in the appropriate administration of curative means.

4. (*d.*) The *diseases* of the rectum and anus will receive but a brief consideration in this place, especially as several of them require surgical treatment, although neither so generally nor so frequently as many surgical writers maintain. The strictly medical discussion of these diseases will chiefly engage my attention, and with a due regard to the importance of the topics which will successively come before me. Much misapprehension has existed, and still more misrepresentation have gone forth, respecting the sources, the nature, the frequency, and the treatment of several of these diseases, both medical and surgical; and whilst not only in practice, but also in publications, deception, mystification, and injurious means have been resorted to or recommended by a few, the nature and treatment of these maladies have been elucidated by several able, experienced, and honest writers, to whom, and to my own observations, I shall chiefly refer.

5. I. MALFORMATIONS OF THE RECTUM AND ANUS fall not within the province of the physician beyond a recognition of their nature and consequences, as all attempts to remedy them belongs to the province of the surgeon. These malformations are,—1st. Imperforation of the anus:—2d. Imperforation of the rectum:—3d. Unnatural termination of the rectum:—4th. Termination of other organs into the rectum; and, 5th. Absence of the rectum. It is chiefly the first and second of these which admit of surgical aid; and the writers referred to furnish ample directions for the best manner of affording it. I may add, that the anus may be so formed as hardly to amount to a malformation requiring surgical, although sometimes occasioning, or heightening disorders which are more or less medical. This outlet may be either too *small* or narrow, congenitally, or too *large*. The *former* may be so considerable as to interfere with the function of defæcation, and lead to serious consequences. Hence the occurrence of such a conformation should be kept in recollection in cases of fæcal retentions during infancy and childhood. A *large* or *wide* anus is not infrequent; and when the sphincter ani is impaired in power, prolapsus of a portion of the rectum is thereby favoured; and a portion of the mucous secretion of the lower part of the bowel, sometimes with a little fluid fæces, occasionally escapes.

6. II. FOREIGN BODIES IN THE RECTUM, AND LACERATION OF THE RECTUM AND ANUS, although strictly belonging to the surgeon, should receive due attention from the practical physician.—4. *Foreign bodies* may be lodged in the rectum in three ways:—1st. The body may have been

swallowed, and have passed along the alimentary canal without occasioning much or even any disorder, until it reached the lower part of the rectum, where it is retained;—2d. Concretions may form in the bowels, or indigestible substances may collect and congregate in them, or gall-stones may pass into them and occasion obstruction in the rectum. Although these are not always foreign to the œconomy, they are as respects the healthy functions of the bowel, and there act as foreign bodies;—3d. Various substances or bodies may be introduced accidentally or voluntarily into the rectum through the anus, and occasion mechanical irritation, or obstruction, or ulceration, or inflammation, according to the nature, form, or consistence of such bodies.

7. (*a.*) *Foreign bodies* are often swallowed by infants, and accidentally by children or older persons, and, after passing through the bowels, causing either little or no disturbance, or more or less suffering, are arrested at the sphincter ani, producing painful tenesmus and straining, and much consequent disease, if the state of the anus and rectum be not carefully examined. Instances are not infrequent of infants and children having swallowed rings, with various kinds of stone, coins, pebbles, the large stones of fruit, pieces of glass, &c. and experienced little or no disorder until they reached the sphincter by which they were arrested. An attentive examination of the anus, as soon as straining at stool is complained of, and a careful introduction and turn of the finger in such cases, will readily turn out the obstructing body.

8. (*b.*) *Concretions* formed in the bowels are occasionally passed along the canal until they reach the anus; and, when much fæcal matter and flatus are collected in the colon and rectum, behind the concretion plugging up the inferior portion of the rectum and anus, the nature of the disorder is often misunderstood, and a mischievous perseverance in the exhibition of purgatives by the mouth often increases, instead of removing the evil. Nor is the cause of disorder always ascertained by prescribing enemata; for these may pass the cause of obstruction—the pipe of the instrument may either pass by the side of the concretion, or may even perforate the substance of the concretion so formed, and be retained, or pass off by the channel formed by the pipe, without any effect. But the patient may not escape so fortunately; for the enema may be administered by an ignorant or a careless nurse, who in attempting to introduce the pipe of the instrument, and to overcome the obstacle which the concretion furnishes, may actually push the pipe into, or even through, the parietes of the bowel, and convert an easily remedied disorder into a dangerous or even fatal disease. Concretions of various kinds have formed in the bowels and been thus arrested at the sphincter ani, occasioning remarkable disturbance, sometimes without the exact seat and nature of the obstruction having been for some time ascertained. Hardened fæces may collect to such an amount as to fill up the greater part of the pelvis, the muscular coats of the rectum being paralysed by the inordinate distention. But, when the parts are irritable, small concretions, or hardened fæces of comparatively small bulk, will produce great disorder from the irritation, and the consequent straining they occasion, and from the accumulations of fæces and flatus, and of retained secretions and excretions above them. In the

course of practice, I have been called to cases where the concretions obstructing the rectum and anus consisted in one case of brown paper which had been habitually chewed and swallowed; in another of wax, which had likewise been chewed and swallowed; in a third case of sealing wax of various colours which had been likewise swallowed; and in a fourth of chewed cedar of which drawing pencils are made. The first and last of these cases occurred in girls at school, the substances having been reduced to a pulp, and having passed into the bowels, were cemented by mucus into balls so hard as not to be capable of changing their form so as to pass the sphincter without producing great disorder. The second and third of these cases occurred in married women, under thirty years of age, without children; the wax being agglutinated into large hard balls. These concretions were numerous in all the cases, had evidently existed long in the cells of the colon, until the irritation they produced and the treatment adopted had dislodged them, and carried them to the rectum, when they were arrested by the sphincter. Besides these, magnesia, the carbonate of iron, and other substances, may form concretions productive of the disorder, to which attention is now directed.

9. (c.) The *treatment* of indurated substances, whether altogether foreign, or partly or wholly formed in the bowels, is generally simple; and if judiciously managed may be brought to a successful issue without much or even any surgical aid. Warm olive oil should be carefully injected; and the concretions, if still retained, should be turned out by the slow introduction of the finger; and the gradual resistance thereby furnished to the irritable contractions of the sphincter will facilitate their expulsion. When the concretions are less indurated, or consist of hardened fæces, they may be broken down by the handle of a spoon, or by a marrow-spoon, and then oleaginous enemata will remove the parts which still remain. As respects the effects produced by *foreign bodies* introduced through the anus, and the removal of these bodies, I must refer the reader to the surgical works enumerated or referred to in the BIBLIOGRAPHY.

10. (d.) *Lacerations of the rectum and anus* are not infrequent occurrences. They vary much in their extent, in their seat, and as respects the direction in which they occur. They may be complete or incomplete as regards the coats of the intestine; and they may be limited to either the rectum or anus, or extended to both. The rectum or anus, or both, may be torn partially by the passage of large concretions, or hardened fæcal matters, passed hastily, or after violent straining. Such occurrences are rare; and the laceration is generally *partial* or *incomplete*, or involving merely the inner coats. *Complete laceration* takes place almost always from external injury or accident, and from parturition. *This form* of laceration may be limited to the anus, or not extend above the sphincter; and it commonly is caused by parturition. An instance, however, came under my notice of its occurrence from sitting upon a chamber pot which had been previously cracked. A *second form* is that consisting of rupture of all the coats within the sphincter, the anus, especially at its origin, not being injured. This form may be caused by foreign bodies in the rectum, by an unnatural position of the child during parturition, or by the

unskilful use of instruments for this process. A *third form* of laceration consists of a division of the rectum and anus, and is caused by parturition. In this variety the recto-vaginal partition, the perineum, anus, and sphincter are all torn, the rectum and vagina forming one cavity.

11. (e.) The *treatment* of partial and complete laceration of the rectum and anus is chiefly surgical. When the laceration is only partial, medical treatment will generally be sufficient. A prudent recourse to olive or castor oil, to oleaginous and demulcent enemata, occasionally to suitable ointments, to the supine posture, and to a spare farinaceous diet, will commonly remove this lesion in the course of a few days. Inattention or maltreatment, a too full diet, or a too heating regimen, may cause partial laceration to be followed by inflammation, or by ulceration, or by abscess, or by fistula — lesions which will be considered in the sequel.

III. INACTION OF THE RECTUM AND ANUS. —

SYNON. — *Local Paralysis of the Rectum and Anus*, — *relaxation or atony of these parts*.

CLASSIF. I. CLASS. I. ORDER. (*Author in Preface.*)

12. DEFIN. — *Retention and accumulation of fæcal matters in the rectum, with constipation and a sense of fulness and weight in the pelvis, and with an inability to expel the contents of the bowels.*

13. This complaint, which is not infrequent in aged persons, especially in old females of sedentary habits, in aged debauchees, and in other persons who have exhausted the energies of the ganglial and spinal nervous systems, has hitherto been confounded with the more common states of constipation. It is moreover the usual form of constipation in connection with palsy, especially with paraplegia and general palsy; costiveness or obstinate constipation thus proceeding not only from various kinds of obstruction in the vicinity of the anus or in the rectum, but also, in a different class of cases, from defective contractility of the muscular coats of the rectum, owing to impaired or lost power of the ganglial and spinal nerves actuating these coats.

14. I. CAUSES. — (a.) The circumstances chiefly *predisposing* to this complaint are the usual causes of debility or exhaustion, more especially very advanced age; sexual excesses, masturbation, or excessive voluntary or involuntary pollutions; want of exercise in the open air, sedentary occupations and habits; the rheumatic and gouty diathesis, especially when accompanied by pains in the loins from congestion of the spinal sinuses or veins, and low or nervous fevers, or convalescence from them.

15. (b.) The most common *exciting causes*, are neglect of the early intimations to evacuate the bowels, the rectum thus becoming over-distended by fæces and flatus, and the muscular coats thereby losing their powers of contraction; paraplegia or paralytic affection of any kind; hysterical disorders; inordinate sexual indulgences; diseases of the kidneys; congestion of the spinal veins or sinuses, however produced; exposure to cold, or to currents of air, especially when directed on the loins or sacrum, and an excessive use of calomel or aloetic purges. But whatever impairs the vital energy of the ganglia and ganglial plexuses of the pelvic viscera, or whatever suppresses, removes, or diminishes the influence of the spinal

nerves, with which the pelvic ganglia are reinforced, as congestion, inflammation, injury, or structural lesions of the spinal cord, will generally be followed by inaction or paralysis of the coats of the rectum, and generally also with relaxation of the sphincter ani.

16. ii. SYMPTOMS.—Besides the usual symptoms of constipation, the patient feels a weight and distention, sometimes with pain or aching in the pelvis towards the sacrum. The desire to evacuate the bowels is often slight or absent; or if it be experienced, there is an inability to accomplish the intention. In many cases, the retained fæces which are the lowest in the rectum become remarkably indurated, and furnish an obstacle to the evacuation of the portions above. In some of these cases the sphincter ani is so relaxed or paralysed as to admit of the hardened fæces being seen through the open anus. Not infrequently these cases proceed from neglect of local examination, and from purgatives given by the mouth being confined in alone, until a fatal issue ensues; and, if the administration of enemata be entrusted to an ignorant nurse, the nature of the disorder is equally unknown; and these medicines are reported to have been either inefficacious, or immediately returned.

17. If the complaint continues, without removal of the fæcal accumulations, ulceration or sphacelation of some portion of the parietes of the rectum, with absorption of excrementitious materials into the circulation, is a common result; occasioning low irritative fever, pains about the sacrum, vomitings, suppression or incontinence of urine, restlessness, followed by coma and nervous symptoms, varying with the circumstances and complications of individual cases. In some instances, violent pains, occurring in paroxysms, are complained of towards the close, or at an advanced stage of the disease, and dart down into the pelvis and to the anus; but contingent phenomena vary remarkably with the age of the patient and the morbid associations or peculiarities of the case.

18. iii. COMPLICATIONS.—This affection occurs much more frequently in connection with some other malady, than as a simple or primary disorder. In the latter form, it is occasionally met with in aged persons or exhausted constitutions, more especially in sedentary females; and it may continue until the unfavourable issue mentioned above (§ 17.) supervenes. It is a common attendant upon paraplegia, partial or complete, or from whatever cause, and upon general paralysis, and the palsy of the insane; and, in these maladies, it is often associated with relaxation of the sphincter ani, fæcal accumulations being thereby prevented, the evacuations passing off involuntarily, or as position and gravitation may favour their exit. It is also not infrequently complicated with diseases of the uterus and ovaria; with displacements or enlargements of the uterus; or with diseases of the kidneys or urinary bladder, or with enlargement or other lesions of the prostate gland. It is often associated with impaired function of the rest of the digestive canal, or with torpor, obstruction or organic lesions of the liver.

19. iv. TREATMENT.—In the more simple states of this disorder purgation requires to be aided by stimulating enemata. Often a combination of di-sulphate of quina with the purified extract of aloes, or this latter with the compound galbanum

pill, or these three medicines conjoined, will sufficiently excite the action of the rectum. If these fail, the more violent cathartics, as croton oil, the extract of elaterium, &c., will occasion more disorder than benefit; for, if this latter be derived, it is only temporary, inaction of the bowel being increased by them. Suitable enemata are generally required, and the addition of the spirit of turpentine to the injection is usually beneficial. It is not uncommon to find the rectum enormously distended with hardened fæces, when proceeding to administer an enema; but the state of the rectum and anus ought to be previously ascertained; and the accumulation should be removed, at least in part, by direct and mechanical means, before an injection is administered. The kind of enema adopted ought to depend upon the circumstances and complications of the case, and the effect produced; but a daily recourse to it is generally requisite.

20. In *complicated cases*, the treatment should also be directed to the associated malady; but, in these generally, the means now recommended will prove more or less serviceable, although others may be required in addition. In all cases, the state of the urinary functions requires attention; and undue accumulations of urine in the bladder must be prevented. The condition of the sphincter ani, and of the sacrum, or other parts unduly pressed upon, should be ascertained; for, when the sphincter is relaxed, much inconvenience and increase of disorder, with bed-sores, &c., will follow, and will with difficulty be prevented, although the greatest care be exercised, especially in aged, paralytic, and debilitated persons. In these persons especially, not only are the muscular coats of the bowel paralysed, but the secretions from the villous surface and mucous follicles are remarkably diminished, thereby favouring induration of the contents, and delaying or preventing their passage from the bowel. In these cases, the injections, whether saponaceous, saline, oleaginous, or terebinthinate, may be advantageously thrown up as high into the colon as possible by means of the flexible tube, as recommended by Dr. O'BEIRNE, for in such instances fæcal accumulations may exist far above the rectum. The combination of di-sulphate of quina, aloes, and compound galbanum pill, recommended above (§ 19.), or the two former with inspissated ox-gall, as advised by me in 1832, will generally restore the action of the bowels, unless in extreme or seriously complicated cases.

IV. INFLAMMATIONS OF THE RECTUM AND ANUS.

—SYNON. *Proctitis* (from *πρωκτος*, anus);—*die Afterentzündung*, Germ.

CLASSIF.—III. CLASS. I. ORDER (*Author in Preface*).

21. DEFIN.—*Pain and heat in the anus, extending up the sacrum and pelvis, with continued tenesmus or straining.*

22. Inflammations of the rectum and anus have been most unaccountably neglected by medical and surgical writers, and too generally overlooked in practice, more especially by those empirical physicians who plume themselves upon being “bold” or “active” practitioners, and who are so on inappropriate occasions, “ad captandum vulgus,” rather than from a conviction of the benefit derived by those who are subjected to the infliction. *Proctitis*, in some form or other, I

have frequently found produced, either as a sequence, or as a complication, of some other disorder, by "heroic" practitioners, who claim for themselves a special consideration and notoriety,—actually produced by the excessive doses, or frequent repetition, or prolonged use, of those substances which irritate the lower bowels. How remarkably indebted must the surgeons of the present day, and indeed of the last half century, have been to physicians and others, for their frequent recourse to large doses of calomel and other medicines which have either excited or perpetuated, or in both modes developed, not merely inflammation of the rectum and anus, but also the various organic lesions about to be noticed as consequences of inflammation of these parts.

23. *Inflammations of the rectum and anus* are not of one only type or kind as respects the nature of the morbid action, and the consequences which follow. As I have shown when treating of INFLAMMATION, and of DYSENTERY, proctitis may be *sthenic*, or *asthenic*, or *acute*, *sub-acute*, or *chronic*. The inflammation may commence in the rectum and extend even to the verge of, and around the anus; or it may begin in this latter situation and mount upwards, not merely to the rectum, but also to the colon, and even to the cæcum and small intestines. In all cases, and these by far the most numerous, the disease extends to the colon and cæcum, and often still further; constituting, according to the character of the constitutional and local symptoms, the forms of DYSENTERY which I have so fully considered, as not even now to admit of any addition, alteration, or correction. When inflammation is confined chiefly to the rectum and anus, although closely allied to dysentery, it is nevertheless more or less distinct from that malady, more especially when it is sub-acute or chronic, and is produced, as I have seen it in numerous cases, by the treatment which has been either adopted on erroneous principles, or carried too far. When thus produced by medicinal agents, proctitis may commence in the rectum, or in the lower part of the colon and rectum, or extend from one to either. When it is caused by agents acting externally, or locally, upon the anus, it may be then limited to this part, if the agents are not contaminating; but if they are infecting or contaminating, the rectum is soon invaded, and the inflammation, always then of an asthenic and spreading character, extends much higher, and to an indefinite extent.

24. i. SYMPTOMS OF PROCTITIS.—The phenomena of this disease vary with the cause, with the constitutional powers of the patient, and with the severity of the morbid action.—A. *Acute sthenic Proctitis* is attended by heat and pain at the anus, shooting or extending to the lowest part of the back, or under the sacrum; and by a continual desire to go to stool, with straining, and with the passage merely of mucus, sometimes streaked with a little blood. In some instances an exudation of lymph, similar to that in croup, takes place, and is thrown off in a more or less consistent or membrane-like form. If fæculent matter be passed at any time, it is usually with much increase of pain, and after having been retained for a longer or shorter time by the irritable and constricted sphincter; and the passage of pellets of fæces, with the straining or tenesmus, often

occasions a slight prolapse of the inner coats of the bowel, which appears swollen, red, hot, and injected, partially covered with mucus, or with exudations of lymph, and with the mucous follicles enlarged. When the prolapsus is more considerable, and is accompanied with spasmodic constriction of the sphincter, the pain and restlessness are much increased, and shoots upwards along the sacrum in severe paroxysms, a distressing aching being constant in this latter situation.

25. The *symptomatic disturbance* varies with the constriction and severity of attack. There may be neither rigors nor chills at the commencement, unless the disease follow the local action of cold, or the cause be of a severe character. But more or less febrile action, with a white or loaded tongue, heat of skin, impaired secretion and excretion; scanty urine of a high colour, voided frequently and with difficulty, owing to the extension of irritation to the prostate gland and neck of the bladder; an accelerated, full, or strong pulse; loss of appetite, but rarely vomiting, unless the disease has been neglected, or fæcal matters have been long retained and largely accumulated, and constipation of the bowels.

26. The *terminations* of this form of proctitis are—1st. resolution;—2d. In hæmorrhagic exudations, which may resolve the inflammation; or, if the disease be associated with a varicose state of the hæmorrhoidal veins or hæmorrhoids, as often is the case, in a hæmorrhoidal discharge;—3d. In ulceration of the inner coats of the bowel, the ulceration commencing either in the mucous follicles, the ulcers being either few in number or several; or in the abrasion of the villous coat, the ulcer being single, or very few:—4th. Rarely in sphacelation, unless that portion of the inner coats of the bowel which has protruded and been strangulated by the sphincter;—5th. In abscess in the vicinity of the anus, or external to some portion of the parietes of the bowel, or in the connecting cellular tissue between the rectum and neck of the urinary bladder, or between the rectum and vagina, the abscess ultimately terminating in fistula; or in one or more small abscesses in the connecting cellular tissue of the rectum or anus;—6th. In inflammation of the hæmorrhoidal veins, especially when the disease is complicated with hæmorrhoids;—and 7th. In chronic inflammation of the rectum and anus, and the several structural changes consequent upon it. (§§ 43. *et seq.*)

27. B. *Sub-acute and chronic Proctitis* may be either primary or consequent upon the acute form now described, the symptoms of the latter gradually subsiding to the sub-acute and chronic states successively. If the chronic form become prolonged, various changes of structure and complications may follow, attended by distressing symptoms; and, if the complaint receive not due attention, the life of the patient may be endangered.—(a.) *Sub-acute sthenic proctitis* is characterised by similar symptoms to those above enumerated, the chief difference consisting in their milder form; and, if not appropriately treated, in their longer duration. This form is not infrequent in females; and in them the occurrence of the catamenia is often followed by resolution of the inflammatory action. With the exception of sphacelation, the same *terminations* as I have stated to follow acute sthenic proctitis

may also follow the sub-acute form, but generally as consequences of neglect or improper treatment, which often occasion this form to pass into the following and its consecutive organic lesions.

28. (b.) *Chronic Proctitis*, although often consequent upon the acute or sub-acute states, may also occur primarily, especially in persons who are subject to hæmorrhoidal affections, or who have habitual recourse to calomel or aloetic and resinous purgatives, or who are exposed to the influence of certain noxious agents. This form of the disease may be seated chiefly in the mucous follicles, or in the mucous surface itself, or it may extend, especially when it is of considerable duration, to the connecting cellular tissue, occasioning more or less tumefaction or thickening of the parietes of the bowel. Chronic proctitis is more frequently a complicated, than a simple affection; and, when associated with other disorders, as with hæmorrhoids, with leucorrhœa in the female, with spasmodic stricture, or with fissures of the anus, it may be either the primary or secondary affection. It is generally attended by more or less tenesmus or pain and straining at stool; by a sense of aching or pain under the sacrum; by slight prolapsus of the inner coats after alvine evacuations; sometimes by dysuria and frequent micturition, and often by the exudation of mucus from the anus—*Proctorrhœa*, of some authors,—*Medorrhœa ani* of J. P. FRANK,—especially when the irritation is kept up by the presence of ascarides in the rectum, or when the mucous follicles are affected, or when the disorder is associated with leucorrhœa.

29. The *Terminations* of chronic proctitis are, 1st. Resolution;—2d. Ulceration, generally commencing in the mucous follicles;—3d. Fistulous ulceration, with or without abscess or purulent collection in the vicinity of the anus;—4th. Fissures of the anus, generally in connection with hæmorrhoidal tumours, or spasmodic stricture of the rectum, or with both;—5th. Tumefaction, thickening, and ultimately induration and constriction of the coats of the rectum; and 6th. Ulceration, associated with thickening, or with induration and constriction, or with all these changes.

30. D. *Asthenic Acute Proctitis* may commence with or without rigors; and, although it occurs chiefly in delicate, exhausted and cachectic persons, it may affect any temperament or constitution when the contaminating or infecting exhalations which usually produce it are directed against the exposed anus; as when persons frequent privies which contain accumulated fæces, and emit an abundant infecting vapour.—a. This form of proctitis is attended by many symptoms of the sthenic acute form; but the symptoms are more severe, the suffering more acute, the spasm of the sphincter is more severe, or occurs in more distinct paroxysms, and the mucous discharge following the straining is more copious, watery, ichorous or bloody, and more offensive than in the sthenic form. The disease, moreover, is rarely limited to the rectum, unless the treatment be prompt, energetic and judicious; but extends along the colon, and assumes all the characters of asthenic dysentery, with the constitutional symptoms and terminations described when treating of this form of that malady (see Art. DYSENTERY, §§ 20, *et seq.*). Asthenic proctitis is generally at-

tended by much fever; a quick, soft or weak pulse; by much heat of skin; a foul or loaded tongue; by tenesmus, dysuria, or frequent micturition; by retention of fæcal matters, and many of the phenomena of adynamic fever. Prolapsus of the inner coats of the bowel is frequent; and, if this be attended by violent or continued spasm of the sphincter ani, sphacelation, foul ulceration, exudations of an offensive sanies, implicating more especially the prolapsed parts, are common results.

31. b. The *terminations* of this form of proctitis depend upon the period at which treatment has been adopted, and the nature of the means employed. Beside the terminations already mentioned (§ 26.), the passage of the disease into dysentery, especially the asthenic form, contamination of the circulating fluids, vital exhaustion, extensive ulcerations, sphacelation, and the other consequences of dysentery, may supervene.

32. c. The *complications* of asthenic proctitis are often serious, and demand careful examination and treatment. The neck, and even the parietes of the urinary bladder, with the prostate and urethra, are not infrequently implicated in the male, causing frequent and painful micturition, or even retention of urine; and the vagina, os and cervix uteri, are even still more frequently affected in the female; occasioning severe paroxysmal pains, referred to the vagina and uterus; and sometimes also much disordering the urinary functions.

33. E. *Syphilitic and gonorrhœal proctitis* are occasionally observed, especially in females of a certain class; but these specific forms of disease require no further notice at this place, than that the practitioner should not mistake their nature. They are more frequent in females than males, chiefly owing to the readiness with which the infecting virus may be communicated, by proximity of parts and by position, from the vagina to the anus. Syphilitic proctitis often speedily passes into ulceration, &c. within and around the verge of the anus; whilst the gonorrhœal form of the disease is attended with much excoriation, swelling, and discharge at the orifice of the anus, and at the internal surface of the nates adjoining the anus.

34. F. *Inflammation*, often with extensive *excoriations of the anus*, is not infrequent in *infants and young children*. In some cases the inflammation seems to originate externally to the anus, or at its external margin; and is either symptomatic of disorder of the digestive canal, caused by the state of the mother's or nurse's milk, or by improper food, or by disordered secretions and excretions; or it is more directly produced by want of cleanliness, and the accumulation of irritating sordes in this situation. In plethoric, gross, or unhealthy children, the inflammation almost threatens the adhesion of the opposite surfaces of the nates. In those cases, the disorder is attended by much fever—by a hot, dry skin, and a full, excited pulse. In other instances, the inflammation extends to the anus from the rectum, and then the child has remarkable straining, with very scanty mucous evacuations tinged with blood; and often also dysuria. This state of the affection is not infrequent during weaning or dentition, and is often symptomatic of disorder of the digestive canal at these periods, or is caused by the nature or the excess of the ingesta. In some cases, the

disease assumes a sub-acute asthenic form resembling aphthæ, upon which it not infrequently supervenes, or with which it is complicated; more or less disorder or marked lesion, apparently extending along the whole digestive canal, but becoming more developed and apparent at both the entrance and outlet—in the mouth and lips, and in the anus, where the vital action of the parts is modified by the copious accession of sensory and motory spinal nerves (see Art. THRUSH).

35. ii. CAUSES. — (a.) The *predisposing causes* of proctitis are the irritable and sanguine temperaments; an irritable or susceptible state of the intestinal canal; the existence of worms in the intestines; a full habit of body in connection with hæmorrhoidal affections; venereal excesses and voluntary or involuntary pollutions; diseases of the prostate gland or neck of the bladder; and morbid or long retained alvine secretions and excretions. — (b.) The *exciting causes* are chiefly those which act through the medium of the intestinal canal; and those which act externally or locally. Of the former, the ingesta, medicinal and dietetic, are the most frequent and important. Calomel and other preparations of mercury in large or too frequent doses, or in prolonged courses; arsenic similarly prescribed; aloetic and resinous purgatives habitually or frequently taken; hypercatharsis, however produced; the prolonged or excessive use of emmenagogues; substances swallowed with the food, accidentally or otherwise, which irritate or penetrate the coats of the rectum, as fish-bones, or the spiculæ of other bones; the husks, seeds, or stones of fruit; and the very hot and least soluble spices, when taken in excess. Other substances accidentally swallowed, which irritate mechanically the rectum or anus; morbid or retained secretions and excretions, accumulated fæces, concretions formed in the bowels, hæmorrhoidal affections; and the irritation of worms, are also occasionally exciting causes of this complaint.

36. The external agents are chiefly injuries, accidents, wounds or operations, implicating the rectum or anus; the contingencies of parturition and the puerperal state; the administration of acrid or stimulating enemata, injections or suppositories; injury sustained by the bowel during the administration of enemata; abstracted animal heat by sitting on cold seats, on stones, or on the ground; currents of cold air; the application of gonorrhœal or syphilitic poisons, or other infecting agents; and frequenting foul privies where the fæcal accumulations are great, and where the foul exhalations rise against, and infect, the anus during defæcation. Of the influence of this last cause of proctitis I have observed several proofs in the course of practice. The inflammation which has resulted has generally assumed the form of asthenic dysentery (see DYSENTERY, §§ 20. *et seq.*); and when females have been exposed to this cause, not only has asthenic proctitis passing into dysentery been the occasional result, but also asthenic vaginitis, sometimes with asthenic hysteritis, attended by acute pain and by a copious or an offensive vaginal discharge, this complication appearing most frequently and remarkably in married females.

37. iii. TREATMENT should differ most remarkably with the activity and character of the inflammatory action, and the nature of the predisposing

and exciting causes.—A. In *sthenic acute proctitis*, local depletions, especially cupping over the sacrum, leeches to the perinæum and around the anus; cooling and demulcent aperients; the warm bath, semicupium or hip-bath, followed by cooling diaphoretics, and fomentations, with an antiphlogistic regimen, are the most efficacious, and generally remove the disorder in a few days. If much pain and tenesmus continue after depletion, the compound ipecacuanha powder, or simple ipecacuanha, with henbane, extract of hop or of poppy, ought to be given in the form of pill, the ipecacuanha in as large and frequent doses as the stomach will tolerate; and, having allayed the irritability, the bowels should be evacuated by fresh castor or olive oil; or by sulphur and magnesia, aided by confection of senna, or by a glass of lemonade, taken soon after the magnesia, or by a demulcent, laxative, or oleaginous enema.

38. B. The *sub-acute and chronic states* of the complaint generally yield to the same means as just advised; local depletions to a less amount being usually sufficient; but these should vary with the habit of body and circumstances of the patient. Ipecacuanha, cooling diaphoretics, warm baths, and emollient laxatives, with demulcent and anodyne enemata are generally beneficial. If external irritation, heat, or excoriations are experienced at the anus, a cooling and anodyne lotion, as a solution of the diacetate of lead, with vinum opii and acetic acid, will give much relief, and may be kept applied for a considerable time by means of pledgets of lint. The secretions and alvine excretions, especially the biliary, should be promoted by means of hydrargyrum cum creta, or Plummer's pill, conjoined with ipecacuanha and soap, interposing a dose of castor or olive oil; or a demulcent and oleaginous enema.

39. C. *Asthenic proctitis* rarely admits even of local depletions, unless in plethoric persons. As the chief danger in this form of the complaint proceeds from the rapid extension of the disease along the rectum to the colon, the principal indication is to prevent or limit the extension by such means as experience has shown to be most efficient in this mode of operation. I have found the warm-bath, or hip-bath, followed by a warm terebinthinate embrocation applied over the sacrum or the hypogastrium, and the following pills, amongst the most efficacious means. As soon as the more painful symptoms, especially the spasm of the sphincter ani, were relieved, or even without waiting for such relief, the subjoined draught was also administered.

No. 328. R. Pulv. Ipecacuanhæ; Quinæ Disulph. Camphoræ, āā, gr. j. Extr. Humuli, vel Extr. Gentianæ, gr. iij.; Confect. Aromat. gr. ij.; Mucilag. Acaciæ, q. s. M. Fiant Pilulæ, ij. quarta vel quinta quaque horâ sumendæ.

No. 329. R. Olei Terebinth., Olei Ricini, āā, ℥ss.; Aquæ Menthæ Virid. ʒvjss.; Tinct. Capsici, m. iij. M. Fiat Haustus.

40. Demulcent and anodyne enemata are always beneficial, if early employed; or before ulceration or sphacelation of the internal coats of the bowel has commenced; but the utmost care ought to be taken in administering an enema, lest the pipe of the instrument injure the swollen, softened, and tender parts along which it is passed. In every other respect the treatment should be identical with that advised for *asthenic dysentery*, especially if the morbid action has advanced to

the colon and cæcum, or has continued any time. (See art. DYSENTERY, §§ 88. *et seq.*).

41. *D. Inflammations and excoriations of the anus and rectum in infants and young children* (§ 34.) should be treated with a strict reference to this cause. The diet of the infant, and even of the nurse, should be changed or corrected; the secretions and excretions improved and promoted; and, after the warm bath, emollients, &c., the zinc ointment, or lead ointment, or cooling lotions, or other means which the peculiarities of the case require, should be applied. In most of these cases, more or less constitutional disorder is associated with disease of the alimentary canal; and this latter is seldom confined to the rectum and anus; the colon, or the digestive organs generally participating more especially in the existing derangement. In these circumstances, the hydrargyrum cum creta, conjoined with ipecacuanha, with small doses of rhubarb, and with absorbent powders, or other ant-acids, will frequently prove most beneficial; and sometimes equal parts of precipitated sulphur and carbonate of magnesia, to which powdered liquorice root and cinnamon are added, in quantity sufficient to render the whole more pleasant, may be taken in milk or in water.

42. *E. The specific—gonorrhæal and venereal—forms of inflammation of the anus and rectum*, should be treated conformably with the principles which guide the treatment of these maladies, in other situations and circumstances. The local affection will, however, require much of the soothing means already advised for other inflammations of these parts:—the gonorrhæal especially, local depletions, saturnine or cooling and anodyne lotions, &c.; and, internally, the balsams, especially copaiba, powdered cubebs, or a decoction of the *Achillea millefolium*. Clysters are of doubtful advantage in the specific states of the disease, as they may favour the extension of the specific infection from the anus to the rectum and lower parts of the colon.

43. *iv. ITCHING OF THE ANUS.*—*A.* This is generally a symptom only of diseases of the digestive canal, or of the rectum and parts in the vicinity. It is often, however, so distressing as to form the most prominent disorder; and is then a most obstinate one to remove. It is most commonly caused, at all ages, by ascarides in the rectum, by other intestinal worms, and by chronic eruptions around the anus. It sometimes follows recovery from dysentery. It frequently precedes and accompanies hæmorrhoidal affections; and it often attends and follows the cessation of the menstrual discharge. It is often attended by more or less of mucous discharge from the rectum—or “*medorrhæa ani*.” Pathologically, it may be viewed as an indication of either irritation of the intestinal canal, especially of the rectum, or congestion of blood in the rectum or anus, or cutaneous eruptions near the verge of the anus. It is often produced by the accumulation of fæces in the rectum and colon; by the abuse of calomel, or of aloes, or of other purgatives which act chiefly on the rectum; by various exciting emmenagogues; by irritation or enlargement of the prostate gland, and by self-pollution.

44. *B. The treatment* should be directed to the pathological and exciting causes, and to the complications of the case. Local bleedings are some-

times required, and these are often advantageously followed by cooling lotions, as the acetate of lead, with acetic acid, and the tincture or wine of opium. The yellow wash, or weak solutions of the nitrate of silver, and the other means advised for the chronic cutaneous eruptions affecting this part, should be employed when any one of these is the cause of the itching. In the more obstinate cases, clysters containing turpentine will be found most efficacious; and lotions, or a wash, with a saturated solution of the bi-borate of soda, will also prove most beneficial, and appropriate to all the circumstances in which the symptom appears.

45. *v. MUCOUS DISCHARGE from the rectum.*—*Medorrhæa ani*, J. P. FRANK—is often caused by the same pathological states as produce itching of the anus (§ 43.). *A.* It may proceed also from a chronic state of inflammation of the lower portion of the rectum; and precede, accompany, or follow hæmorrhoidal attacks, the hæmorrhoidal flux being very frequently followed by this discharge. When caused by inflammatory irritation or congestion, it may prove a substitute for the sanguineous evacuations attending hæmorrhoids. It is distinguished from gonorrhœa affecting the anus, or “venereal blennorrhœa,” by its tenacious state and transparent appearance, which it commonly retains.

46. *B. The treatment* of this discharge depends upon the cause. It is often produced by the abuse of calomel and aloes, and by resinous purgatives and emmenagogues, and is readily cured by relinquishing the use of these. It is a frequent consequence of the congestion, or local determination of blood produced by masturbation; and hence it should excite suspicion of this vice, the existence of which will render treatment inefficacious, but the relinquishment of which will alone remove the disorder. When it follows proctitis, or dysenteric attacks, or attends hæmorrhoidal tumours, or follows sanguineous evacuations from these tumours, the treatment advised for HÆMORRHOIDS will then be required; and when it is caused by intestinal worms, the treatment prescribed for these parasites is then necessary. In many cases, the means recommended for itching of the anus, or for chronic proctitis, will remove this affection.

47. *vi. ABSCESS OF THE RECTUM AND ANUS.*—*A.* Abscesses may form in connection with the rectum or anus, or with both, either consecutively of some form of inflammation of these parts, or from the extension of disease from adjoining parts, or secondarily from phlebitis or from purulent absorption.—(*a.*) When either of the forms of inflammation terminate in abscess, the surrounding and connecting cellular tissue is the seat of the purulent formation. If the abscess form near the anus, it is formed in, and confined by, the surrounding adipose substance. The abscess may be *between* or *external* to, the coats of the rectum: if the former, it is generally very small, or several may exist; if the latter, it is much larger, and is generally single. In cachectic habits it may be very large, and spread to a dangerous extent.

48. Small abscesses, which form in the parietes of the rectum, or superficially near the anus, are generally consequent upon inflammatory irritation in the mucous membrane or its follicles; and in the more healthy subjects, and when the treatment is judicious, they generally terminate without pro-

ducing any of the consequences, to which the larger purulent formations often lead. When the mucous follicles of the rectum or anus are irritated, either by the nature of the excretions which pass over them, or by medicinal excitants, or by the morbid matters existing in the blood that they are partly concerned in eliminating, the irritation may, especially when occasioned by this last cause, rapidly pass into ulceration, which, if it extend to the connecting cellular tissue, may be followed either by purulent collections, or by fistula, or more commonly by both these in succession.

49. (*b.*) Abscesses seldom form externally to the coats of the rectum, or to the sphincter ani, independently of inflammatory irritation of the rectum or anus, or of the urinary and sexual passages. A small abscess, or boil, may however appear, independently of irritation of these parts, external to the sphincter, or near the anus, owing to want of cleanliness or to some other cause; and may, if opened early, and otherwise properly treated, in no way implicate the adjoining canals or their outlets; but, if neglected, or if suppressed externally, it may extend upwards or along the rectum, especially in cachectic habits, and ultimately perforate the parietes of the bowel above the sphincter, and be followed by fistula. Although an abscess may occasionally thus originate, and with an apparent independence of any irritation or disease of the adjoining canals or of their outlets, I believe that instances are rare in which these affections, either of the mucous surfaces, or of the follicles, are entirely absent, these affections proving the exciting cause of the inflammatory action and suppuration external to the rectum or anus.

50. (*c.*) Irritation or inflammation, passing into abscess in or near the rectum or anus, although commonly originating in those parts, and produced by the causes mentioned above (§§ 35, 36.), frequently proceeds from disease—from inordinate excitement, irritation, inflammation, or other lesions, of adjoining parts. In females the abscess may be a consequence of irritation in the sexual passages, and be seated in the anterior parietes of the bowel, or in the recto-vaginal partition, or in the perinæum, and may point or open into either canal or externally, according to its position. In males, inflammatory irritation or diseases of the urethra, of the prostate gland, or of the neck of the bladder, may extend to the adjoining cellular tissue, and endanger the integrity of the rectum by exciting inflammation of, and abscess in or extending to, this tissue. Even the means used to cure disease of the urinary and sexual organs, in both sexes, may excite inflammation or irritation, which will extend in this direction and terminate in purulent formation, which may open into the rectum. Abscess in the vicinity of the rectum or anus may, moreover, depend upon disease of some one of the pelvic viscera, or upon disease or caries of a portion of bone in the vicinity; but these are comparatively rare occurrences, or causes of abscess in this situation. It should not, however, be overlooked, that an abscess may appear near the anus, or may partially surround, or open into the rectum, owing to the extension of disease, and to purulent extension and infiltration, from the vertebræ—the abscess being, in such case, merely a variety of psoas abscess, proceeding from inflammation of the intervertebral spaces, or from caries or tubercular

disease of the bodies of one or more of the vertebræ.

51. (*d.*) Abscess, or abscesses, may form in the rectum or anus, from inflammation of the veins of these parts, or of a hæmorrhoidal tumour, or of a dilated or varicose vein, the purulent collection being more frequently external to the vessel, or in the surrounding cellular and adipose tissues than within, or involving the coats of the vein. It is not improbable, that inflammation of the hæmorrhoidal veins, when commencing in their internal or serous membrane, may sometimes extend more or less along them, and contaminate the blood; or cause coagulation of the fluid in them, or other lesions fully described in the article on the pathology of the VEINS, and be associated with purulent collections in their course, either internal or external as respects their parietes; but these results are certainly not so frequent as may be expected from the exposure of these vessels to the several causes of irritation and inflammation, which so often act upon the rectum and anus, and influence the circulation through the hæmorrhoidal veins, both in health and in disease. It still more rarely happens, that secondary collections of matter form near the rectum or anus in consequence of purulent absorption, the few instances of abscess in these situations which have occurred in the puerperal state being those in which inflammation of the veins of the uterus or of the appendages has extended to the veins and cellular substance adjoining, and has implicated those parts in or near the rectum or anus.

52. *B. The symptoms of abscess* near to, or implicating, the rectum or anus vary remarkably, in severity and character, with the causes of the inflammation of which this is the consequence, with the severity of the inflammation and the extent of the abscess, in no small degree with the particular situation of the abscess, and with the constitution and habit of body of the patient. The symptoms are often, at first, those of proctitis; especially when the disease commences in the rectum or anus itself. But, when the abscess proceeds from inflammation of the adjoining parts, passages, or outlets, or when it is so external to the rectum or anus as at first not to implicate these parts, little inconvenience is experienced there until the outlet is pressed upon, or consecutively inflamed by the progress and distention of the purulent collection.

53. When the abscess is apparently, or even really unconnected with the bowel, or sexual or urinary passages, and is at some distance from the anus (§ 49.), it generally appears in the form of an ordinary boil, and proceeds with central hardness, swelling, redness of a dusky tint, and throbbing, with symptomatic fever, varying in character and severity with the constitution of the patient. If the abscess be of a sthenic nature, the attendant fever is more or less inflammatory, and the tendency to point externally is manifest; but, if it be asthenic, or the constitution cachectic, the local inflammation and the matter produced by it may be diffused, and isolate a portion of the parietes of the rectum, or of the sphincter, and disconnect it from the adjoining parts. In these cases, the constitutional symptoms are always adynamic; and, however frequent the pulse, the vital powers are more or less depressed. In some of these, the abscess will hardly point externally;

or if it thus point, it will do so imperfectly, or assume the character of carbuncle. When the abscess forms near the side of the anus, and much redness or swelling and pain extend to the buttock, with considerable fever, then the more painful symptoms subside upon the formation of matter, especially in the sounder constitutions; and throbbing, chilliness, followed by a disposition to perspirations, with external pointing of the abscess, are chiefly experienced. If, however, the matter is more diffused, if the disease is more asthenic, if the constitutional powers are weak or exhausted, if the superficial appearance of the abscess is more carbuncular, and if more than one opening have appeared on the surface, both the local and general symptoms may be aggravated, or at least not abated; and, with the diffusion of the local lesion, the adynamic fever seriously if not dangerously increased.

54. The severity of the symptoms and the consecutive evils are much increased when the abscess is consequent upon changes of the coats of the rectum, or upon ulceration of the mucous follicles of the rectum or anus, or upon inflammation of hæmorrhoidal tumours, or of the hæmorrhoidal veins; for, in these circumstances, not only are the local changes more complicated, but the constitutional affection is more severe, and the tendency to terminate in fistula, if not in still more serious changes, much greater. Much, however, in respect of severity of local and general symptoms, will depend upon the constitution and habit of body of the patient, and upon the exact seat of the local change. Integrity of vital power will prevent a dangerous extension of the mischief, whilst depressed or exhausted energy, and an impure state of the circulating fluids, and their several concomitants, will increase the evil. The exact situation of the abscess will also remarkably affect the symptoms. If the matter form on one of the sides of the anus, the symptoms will be much less severe than in any other situation: they will be severer if it forms posteriorly; and still more severe if it collects anteriorly; as in this last situation it implicates parts of greater sensibility than in the other situations; and, in the male especially, it involves parts concerned in very important functions—whether extending merely to, or originating in, these parts—and interrupts more or less painfully, and even seriously, their offices. The abscess may in this situation involve the prostate gland, or neck of the bladder, or the urethra, or the vesiculæ seminales, either primarily or consecutively, and thus interrupt the excretion of urine, or cause retention of it, with various associated phenomena.

55. In females, the symptoms are seldom so severe as in the male, especially when the abscess is anterior to the anus or points in the perinæum; and yet I have seen, in two cases, of which strong females of a sanguine temperament were the subjects, both the local and the constitutional symptoms most acute, the abscess having been seated high in the recto-vaginal partition. In such cases, the abscess will not point in the perinæum, but either in the vagina or rectum, according as the parietes of either is primarily or chiefly affected, or as the irritation or cause existed in the one canal or in the other; but when pointing in either direction, perforation of the parietes is generally the consequence, and the risk of fistula being the result is great,

especially if the rectum be perforated, and the constitution be at all in fault.

56. vii. *ULCERATION OF THE RECTUM.*—*A.* Ulceration of the coats of the rectum is not infrequent, especially in the course, or as a consequence, of acute or chronic dysentery, of diarrhoea, especially of colliquative diarrhoea, and of tenesmus. It may take place as a termination of one of the forms of proctitis described above, and it may be either the consequence or the cause of abscess of the rectum or anus. It is frequent in the course of tubercular formations in the lungs, and less so in the advanced progress of organic diseases of the liver. In the former, it is often productive of fistula, having previously occasioned more or less supuration, or distinct abscess in some cases, or a less obvious collection of matter in others; and it generally commences in the mucous follicles, and is often caused by the state of the blood consequent upon softening of tubercles in the lungs, and the absorption of tubercular matter. Ulceration may also follow the opening of an abscess into the rectum, when the matter proceeds from inflammation of adjoining parts, especially of those already enumerated (§§ 49—51.). It may possess asthenic or reparative character, in which case a favourable issue soon takes place; or it may present an asthenic or spreading form; or it may even assume a sloughing or rapidly disorganising state. It may, moreover, be specific, or venereal.

57. *B.* Ulceration of the rectum or anus is more frequently a complication of other maladies, as of those of the lungs, liver, &c. than a primary and simple lesion. It is often associated with other changes in the rectum—with inflammation of the rectum, or of the colon, or of both; with prolapsus ani, with fissure of the anus, with stricture and thickening of the parietes of the bowel, with hæmorrhages from the rectum, of which it is often the cause, and with hæmorrhoidal tumours, internal or external. It is often complicated with, or consequent upon, thrush and excoriations of the anus in children (§ 34.); chronic dysentery and diarrhoea, at all ages, and in all climates; and disease of the mesenteric glands. It is not infrequently associated with lesions of the urinary and genital organs in both sexes; and with tubercular formations in different parts of the body, but more particularly in the lungs.

58. *C.* The causes of ulceration of the rectum are the same as those which occasion proctitis or abscess of the rectum and anus; more particularly the several diseases just mentioned as often associating with them these lesions, as tubercular formations in the lungs or in other parts; disease of the liver and digestive canal; hectic and other fevers; the several kinds of dysentery and diarrhoea; local irritants, and septic or contaminating vapours directed on the anus and rectum in foul privies; substances lodged in the rectum; operations and injuries implicating the rectum or its vicinity; certain kinds of ingesta, both medicinal and poisonous, taken too frequently, or in too large doses, as calomel, arsenic, &c.; scurvy and morbid states of the blood; and excessive sexual indulgencies. (See §§ 35, 36.)

59. *D.* The symptoms of ulcerations of the rectum are often those of chronic proctitis, especially tenesmus, the discharge of puriform, or a mixture of purulent, sanious, and mucous matters in the stools; more or less pain during the passage of

the fæces, often with partial prolapsus of the inner coats of the rectum, and with more or less blood, sometimes a little only, following the fæculent evacuation. If the ulceration exist near to the anus, it may be associated with some degree of fissure; and a sanious or puriform discharge may either exude constantly, or be discharged at intervals from the anus. When the ulcer is considerable and low in the rectum, it may be felt upon the examination; some degree of thickening, with slight induration of the edges, and irregularity of the surface, serving to distinguish it. When it is beyond the reach of the finger, or above the sphincter, its existence may be inferred from the history of the case, especially from the appearance of purulent, or sanious matter, or of blood in the stools, but unmixed with the fæces; from the circumstance of these discharges having followed symptoms of proctitis or of abscess, or attacks of dysentery or chronic or colliquative diarrhœa; from the pain under the sacrum or pubis just before or during evacuation of the bowels; and from the partial prolapsus often attending fæcal evacuations. But it is rather from the association of several of these, than from either singly, that this change is to be inferred. (See art. HÆMORRHAGE—from the Intestines, &c. § 197.)

60. *E. Syphilitic ulceration of the rectum or anus* is a general attendant as well as consequence of syphilitic proctitis. It occurs most frequently in females, owing chiefly to the proximity of the infecting and infected surfaces. The specific characters of the syphilitic ulcer are often, but not always, present. When these are absent, as well as in other circumstances, the history of the case, and the conduct of the patient, as far as that is known, will serve to guide the diagnosis. The existence of other syphilitic symptoms, primary and secondary, should also be ascertained.

61. viii. *FISTULA IN ANO.—Rectal fistula.*—Fistula is the consequence of *abscess* or *ulceration* of the rectum or anus, and hence it proceeds from the same remote causes—predisposing and exciting—as occasion either or both these lesions. It has usually been divided into *three varieties*, the last of which, however, is very doubtful:—1st. *Complete fistula*, which has two openings, one in the rectum and the other externally, —2d. *Incomplete internal*, or *external blind fistula*, which has an opening in the bowel, but none externally. —3d. *The incomplete external or internal blind fistula*, which has an external opening, but no internal opening into the gut. The existence, however, of this third variety has been disputed with much reason. More than one fistula may exist in the same person, and they may be of the same, or of the first and second varieties. They may present various differences; the fistulous canal may extend far up, before opening into the gut, may have several external openings, may extend far beneath the external skin, may be attended by spasm of the sphincter, and by callosities, hardening, and disease of adjoining parts, as the vagina, bladder, urethra, prostate, or even of the pelvic bones.

62. The constitutional and pathological relations of fistula in ano—the frequent dependence of this lesion upon important visceral disease—have not sufficiently engaged the attention of surgeons in devising their intentions and means of cure. Hence the necessity of close investigation of the

causes and complications of all cases of anal fistula which come under medical or surgical treatment. The *causes* of rectal fistulæ are those already mentioned in connection with the diseases already discussed, but more especially injuries of the internal coats of the rectum by foreign bodies, or by retained matters in the bowel; and the suppuration or ulceration of bunches of hæmorrhoids, perforating or destroying the inner coats of the gut. Fistulæ, from this latter cause, generally form slowly. The patient has itching at the anus, and a knobby swelling forms near the anus, which often merely empties itself by a small opening, or which has little disposition to break externally, but rather spreads upwards, or it may be connected above, with a second opening into the rectum. In some cases the fistula is a consequence of injury, or of the burrowing of pus from some adjoining part, depriving the exterior parietes of the rectum more or less completely of their cellular connections. These fistulæ are often critical—or rather the abscesses in which they originate. But more frequently the fistulæ accompanying constitutional disease, especially *phthisis*, originate in ulceration, frequently affecting the mucous follicles, in the manner already mentioned (§ 56.).

63. According to the researches of SABATIER, LARREY, RIBES, and CHELIUS, the internal opening of rectal fistula is most commonly immediately above the part where the internal membrane of the rectum joins the external skin, and rarely higher than five or six lines above this part. Such appeared to have been the result in seventy-five cases examined by M. RIBES. The condition of the fistula is partly shown by the nature of its origin and history of the case; by the circumstances of the discharge being either purulent or fæcal, and by the passage of intestinal gas through it, especially after having been examined by the probe.

64. ix. *TREATMENT OF ABSCESS, ULCERATION, AND FISTULÆ OF THE RECTUM AND ANUS.*—The causes and the constitutional relations of these lesions should determine the indications and means of cure that ought to be adopted. If either lesion proceed from constitutional or general disease, the treatment should be chiefly constitutional and dietetic. If either have arisen from acute or sub-acute proctitis, the means already mentioned as appropriate for chronic proctitis (§ 38.) may be employed; but these should be varied with the diathesis, the complications, the duration or the obstinacy of the disease, and the habit of body of the patient.

65. *A.* When the *abscess* is of a sthenic character, is apparently only forming, then leeches, and soothing applications may be employed; but in all cases, whether sthenic, asthenic, carbuncular, spreading or burrowing, they ought to be opened as early as matter is formed, and a free external outlet to it be afforded. Afterwards, as well as when *ulceration* of the internal coats of the rectum are ascertained upon examination, the treatment, both local and general, should depend entirely upon the features and pathological associations of the case. If the abscess or ulceration has not advanced to the formation of either an incomplete or complete fistula, such means as are most likely to promote the circulation through the portal vessels, and remove obstructions from the liver, ought to be adopted, aided by soothing, stimulating, or as-

tringent and tonic means, locally or constitutionally, according to the peculiarities of the case. With these views, I have given PLUMMER'S pill with soap and inspissated ox-gall; or the precipitated sulphur, with the bitartrate of potash, the confection of senna, and confection of black-pepper, or with capsicum, according to the state of the case. If the rectum continue irritable, or if the ulceration be attended by spasm of the sphincter, emollient injections, the local application of the extract of belladonna, with either of the ointments advised for anal fissure, and a recourse to the decoction of the yarrow, or millefolium, which was recommended to my attention by Mr. PERKINS, of Mortimer Street, will afford relief. If the ulceration be obstinate, small injections of a solution of nitrate of silver, or of mucilaginous mixtures containing spirits of turpentine, or the balsams, especially the Peruvian balsam; or pills with ipecacuanha, capsicum, ox-gall, and one of the balsams, will generally remove the disease, if the evacuations and the diet be duly regulated, and if the constitutional powers be duly preserved or increased.

66. *B.* If the ulceration present a foul, spreading, *asthenic*, or gangrenous character, the treatment both local and general should be of an antiseptic and tonic nature. Applications containing one of the chlorides, or creasote, or spirits of turpentine, or the Peruvian balsam; small injections with these; and the internal use of the decoction of cinchona with alkaline carbonates, camphor, serpentaria, capsicum, aromatics, &c. are indicated in these cases. When the ulceration is considered *syphilitic*, then mercurials, especially the bichloride, in gradually increased doses, or calomel, blue-pill, hydrargyrum cum creta, &c. may be prescribed according to the peculiarities of the case.

67. *C.* *Rectal or anal fistulæ* require the adoption of similar principles and means to those espoused above. These fistulæ often require an operation for their cure; but such operations ought not to be undertaken inconsiderately for the following reasons:—1st. The fistula may be symptomatic of disease of the lungs or liver—of the lungs especially, and the discharge from it may have a beneficial influence on the pulmonary malady. No attempts, therefore, should be made to close this "safety-valve" of the frame in these circumstances, until another has been established in some other quarter; besides, an operation in these cases is often followed by a recurrence of the fistula.—2d. Fistulæ may occur in weak, irritable, nervous, and susceptible persons, even independently of tubercular formations, or of pulmonary disease; and yet an operation by *incision* or *ligature* may be followed by very painful or even dangerous consequences. The accidents which may thus occur are, severe or fatal hæmorrhage, inflammation, copious suppuration, colic, diarrhoea, peritonitis, retention of urine, constipation, erysipelas, &c. Although these ill effects of the operation are most common in persons constituted as above, yet they may appear also in the plethoric, the cachectic, and even in those apparently the least likely to be thus endangered.—3d. Fistulæ, in favourable circumstances, especially during the adoption of means to improve the general health, of a suitable and regular diet, and of a treatment identical with, or similar to, that just advised

(§§ 65, 66.), will heal up favourably, particularly when no visceral disease remains to perpetuate the symptomatic lesion. In all cases, the visceral disease should be investigated, and the treatment in great measure directed to it.

68. As to the performance of these operations I need only refer the reader to the able writings of A. COOPER, BRODIE, W. FERGUSON, CHELIUS, SOUTH, and others referred to in the BIBLIOGRAPHY. But I may here add that they should not be attempted when the patient is the subject of any form of pulmonary or tubercular disease; or whenever the fistula becomes a vicariously secreting organ, by which other ailments are alleviated or removed; or if it be connected with disease of the pelvic bones, or of the prostate gland, or with incurable disease of the liver. In many of such cases, the patient may be relieved by enlarging the external opening of the fistula, and by strict cleanliness. The operation, moreover, will often fail in very old fistulæ, in those which have several openings, or which are connected with callosities or ruptures, or when the internal opening is out of reach. Even when no visceral disease exists, if the fistula have been of long standing, the operation should not be undertaken until an issue or seton has been prescribed.

69. *V.* *FISSURE OF THE ANUS, SPASM OF THE SPHINCTER ANI, AND NEURALGIC PAIN OF THE RECTUM* are more or less connected with each other. I very much doubt the existence of *spasm of the sphincter* independently of either *fissure* or *ulceration* within the verge of the anus; and the *pain*, which is often extremely acute in the rectum, especially after a stool, is generally dependent upon one or other, or upon both, these lesions, and is but rarely of a purely *neuralgic* or even *rheumatic* or *gouty* nature. Indeed the pain cannot be viewed as possessing those characters unless it be independent of spasm, fissure, and ulceration, and alternate, as the case may be, with neuralgia, rheumatism, or gout, in other parts.

70. *i.* *FISSURES OF THE ANUS—anal fissures*—have been well described by BOYER, DUPUYTREN, and BRODIE.—*A. Causes.*—Adults are exclusively subject to this disease. Children and young persons are exempt from it; and it is met with in persons between the ages of 25 and 60; most frequently from 30 to 45. It occurs in both sexes, but more frequently in females than males, and in those of nervous, hysterical, and irritable temperaments. The most common *exciting causes* are constipation and the irritation and spasm thereby sometimes produced. The passage of hard substances which abrade the mucous surface in the situation of the sphincter; injuries occasioned by the administration of clysters; the existence of hæmorrhoids or hæmorrhoidal tumours, and previous operations for these, and the venereal poison flowing from the female genitals and infecting the anus.

71. *B. Symptoms.*—The disease sometimes commences insensibly, in certain cases more rapidly or suddenly. The passage of stools is attended by heat and smarting, and, as the fissure increases, by violent pain, and a sense of spasmodic constriction at the anus. The pain often continues for hours after passing a stool; and in the worst cases it scarcely ceases. It is often increased by coughing, by micturition, or by exertion. It is generally lancinating or burning, and is attended

by restlessness, an anxious expression of countenance, increased nervous susceptibility, and loss of flesh and strength. M. DUPUYTREN states that the disease consists in a lengthy and superficial ulceration in the folds of the mucous membrane of the anus. On separating the orifice and directing the patient to strain, a narrow cleft is observed, with its bottom red, and its edges slightly swollen and callous. It often extends into the rectum; and is more frequently seen at the sides and back of the anus than at its fore part. It rarely extends through the whole thickness of the mucous coat. The most distressing part of the affection is the painful spasm of the sphincter. Sir B. BRODIE remarks, that the constriction of the sphincter at first appears merely spasmodic; but in proportion as this muscle is called into action it increases in bulk; and after the affection has continued for some time it becomes considerably larger. DUPUYTREN and other surgeons consider the fissure or ulceration to be produced by the spasm; but, without denying that the spasm may occasion ulceration, I believe — and I state this from the history of several cases, two of which occurred as early in my practice as 1825 — that the fissure or ulceration is commonly the cause of the spasm. The constriction of the anus is often so great as to render the introduction of any body, even the pipe of a syringe, both difficult and most painful.

72. Fissures present various differences according to their situation. When they are entirely *anal*, or are *below* the sphincter, and are external to the verge of the anus, they are much less painful; and the pains are not materially aggravated by the passage of *faeces*; but there is more or less pruritus; and in this situation the affection is often venereal, especially in females. Fissures may exist *above* or *within* the grasp of the sphincter, or in both situations, extending from the one to the other. When the fissure is above the sphincter it possesses more of the characters of an ulcer. It may be detected there either by means of the speculum or by introducing the finger, to which it feels hard, knotty, or rough; and it is very painful when pressed on by the finger, or when a hardened motion is passed; but the pain ceases soon after, and never continues so long and so violently as when the fissure is grasped by the sphincter. When a consistent stool is passed, the portion of the *faeces* which passes over the ulcer or fissure is often covered by a puriform mucus, sometimes coloured with a little blood. When the ulcer exists above the sphincter, it does not present the appearance of a fissure, and is not usually attended by spasm; nor by remarkable pain until a motion is passed; but possesses the characters, and, by extending, produces the results, already mentioned, especially copious hæmorrhages, abscess, fistula, &c.

73. *C. Treatment.* — Previously to 1825 this affection was generally treated by the operation first recommended by BOYER. At the commencement of that year I was called to a gentleman residing at Wisbeach who was advised by his surgeon to have this operation performed, conformably with the opinion then entertained by the most eminent authorities. He had been long subject to hæmorrhoids, was remarkably nervous and timid, and had the greatest aversion, notwithstanding the violence of his pains, to undergo an operation. He came to London, and placed himself under my care, having heard that I had expressed

the opinion, that this affection may often be completely removed without any operation. Notwithstanding the severity and long duration of the case, I believed that it might be removed by medical treatment merely; and prescribed a light and antiphlogistic diet; demulcents with liquor ammoniæ acetatis; gentle and cooling laxatives; emollient enemata; and an ointment containing one part in seven of the extract of belladonna, which was applied after each stool, and with which the pipe of the enema syringe was directed to be covered when an enema was administered. Within three weeks he returned home quite well, and never had a return of the disease. In the summer of the same year (1825) I attended a lady residing near Russell Square for the same affection, and for which the same treatment was adopted with the like result. Since then I have not treated more than three cases, but these recovered without an operation, the means having been varied according to the peculiarities of each.

74. M. DUPUYTREN remarks, that fissures *below* and *above* the sphincter most commonly heal without an operation; the former with linen or lint spread with simple cerate, opiate cerate, poplar ointment, mercurial preparations; and the latter by soothing and narcotic lotions of decoction of marsh-mallow, poppy-heads, nightshade, henbane, stramonium, &c. thrown up into the rectum. He says that spasmodic constriction is the true ailment, and that the fissure or crack is merely a secondary symptom. This, however, by no means agrees with my observation. The application of belladonna, when judiciously prescribed and aided by a proper general treatment, is commonly most successful in these cases. One part of the extract may be added to seven or eight of a suitable ointment, or the lead ointment or cerate; or one part by weight of the extract, and one part of the acetate of lead, to six parts of any ointment; and this pomade may be applied once or twice daily, or on the surface of a bougie. In cases where a lotion may be preferred to greasy applications, I have found a saturated solution of the bi-borate of soda, with the extract of belladonna, or vinum opii, used as a lotion, almost as efficacious as the foregoing; or a lotion with the diacetate of lead and an anodyne, for the more external fissures. Sir B. BRODIE states that, though he formerly used a *suppository* with extract of belladonna with manifest advantage, yet he is not in the habit of frequently employing it. “Even used in the form of a suppository, the belladonna sometimes produces very serious symptoms by its influence on the brain.” He therefore only gives purgative medicine to prevent hard stools, directs the introduction of a bougie before going to the water-closet, and prescribes an opium suppository at night. But the employment of belladonna in the form of a suppository is not required, and is always objectionable; and much of the success depends upon the selection of laxatives, rather than purgatives, or upon the means by which the bowels may be kept gently open, and the irritation in the rectum and anus at the same time soothed — intentions which the experienced physician will readily fulfil.

75. ii. NEURALGIC, RHEUMATIC, OR GOUTY PAINS OF THE RECTUM OR ANUS are rare, and cannot be admitted to exist, unless they appear connected with neuralgia, rheumatism, or gout in some other part, either before or after the pain had

been felt in the rectum. Pains in the gut or in the anus are generally caused by ulceration, or fissure, or spasm of the sphincter, the existence of either of which should be ascertained whenever pains in these situations are experienced; and if they can be referred to either of these causes, the treatment ought to be directed accordingly. If, however, no such source can be detected, or if they are referable to neuralgia, rheumatism, or gout, the means which have been recommended for these maladies should then be prescribed, and aided by narcotic or anodyne suppositories, or ointments, as advised for spasm of the sphincter.

76. VI. PROLAPSE OF THE RECTUM.—*Prolapsus ani.* — *Vorfall des Mastdarmes*, Germ.; — *Chute du Rectum*, Fr.

CLASSIF. — IV. CLASS. I. ORDER (*Author*).

77. Prolapse of the rectum or anus appears under different forms:—it may be *complete*, the prolapsus consisting of all the coats of the bowel, to a greater or less extent; or it may be *incomplete* or *partial*, and consist only of the inner coats. It may arise from *debility* only, as in children, and in these cases it is generally complete; or from *hæmorrhoidal tumours*; or from *irritation* or *chronic inflammation* of the internal coats; and in these two classes of cases it is generally incomplete or partial, consisting only or chiefly of the mucous and cellular coats. CHELIUS states that this disease appears under *three forms*:—it may be either the rectum with all its membranes, or simply the internal membrane, or an inverted upper portion of the bowel—*volvulus*, or *intus-susception* of the upper part.

78. i. *Prolapse from debility*—*prolapse of all the coats of the rectum*—has been doubted by a few surgeons who could have had no experience of the diseases of children, among whom this affection is by no means infrequent. Mr. COPELAND says, that “in almost every case of prolapsus ani, it is the internal membrane of the intestine only which descends through the sphincter.” No doubt such is the case in the great majority of cases in adults, especially when the prolapse is consequent upon hæmorrhoids and changes just mentioned; but in children, and even sometimes in old persons, especially females, the prolapse is often that of all the coats, and not infrequently to a very great extent; although in them also partial prolapse, or protrusion of the inner coat only, sometimes occurs. It depends upon imperfect tonic contraction of the sphincter, and relaxation of the connections of the bowel with the surrounding parts. It proceeds from the general debility observed in children reared in unhealthy localities, in the ill-fed, and in the offspring of aged and debilitated parents. In some cases both the sphincter and the muscular coats of the bowel seem more or less paralysed. The tumour is usually of a large size; and if it be allowed to remain for some time unreduced, the coats become congested, livid, and thickened, and much difficulty is experienced in reducing it. Mr. SYME considers that the prolapse, involving the whole parietes of the gut, is owing chiefly to irritation. This may be sometimes the case, especially as irritation is not infrequently associated with debility or want of tone of the parts, especially of the sphincter. The tumour is commonly round or oval, but sometimes cylindrical, varies in size from that of a small egg to that of a large orange, exhibits the slimy surface of a mucous membrane,

and affords a secretion similar to red currant jelly. This protrusion is the same as an invagination occurring higher up in the bowels, and differs only in its being so low down as to become external.

79. The *symptoms* of the prolapse vary with the extent of protrusion, and with the habit of body and strength of the patient. They are commonly very severe, and most urgent in young or robust subjects. There are straining and pain at the anus, with obstruction of the fæcal evacuations. If the protrusion continue, the pressure of the sphincter retards the return of blood from the protruded part, which then becomes engorged, livid, and swollen. Inflammation may follow, if the prolapse be not removed; and increased pain, fever, ulceration, sphacelation, or peritonitis, may supervene. Recovery may follow the sphacelation of the protruded part, or death, in consequence of peritoneal inflammation.

80. ii. *Prolapse from hæmorrhoids, or chronic inflammation of the internal coat*, is the most frequent form, and occurs to a much less extent.—(a.) When it is consequent upon chronic inflammation, or inflammatory irritation, there is generally more or less thickening, seated chiefly in the connecting cellular tissue. The frequent straining, often preceding and attending this protrusion, causes a relaxation and elongation of the internal coat, especially when hæmorrhoidal tumours complicate the affection. At first a little reddish swelling only appears, which gradually enlarges, becomes wider, is rounded below, but narrowed above by the sphincter; and, at its free extremity, has an opening by which the stools pass. The surface of the protrusion varies in appearance with the degree of constriction exercised by the sphincter, and with the duration of the displacement. It is red, or livid, soft or slightly tense, often divided into several lobes, and covered with bloody mucus. Dr. BUSHE justly states that, when this protrusion occurs in children, it presents the appearance of a small pyramidal, red, and coiled tumour; while in the adult it is less red, and generally takes the form, either of two lateral flaps, or of a circular fold. “In some of these cases, the portion of membrane protruded comes from the pouch of the rectum, while that within the sphincters remain in situ. When this is the case, the extremity of the little finger may be passed between that portion of the membrane which adheres to the internal sphincter and that which is protruded.” (p. 204.)

81. (b.) Mr. COPELAND observes, that prolapsus ani has so many points of analogy with hæmorrhoids that it may be considered as the same disease in a more chronic and advanced state; and Mr. SYME thinks that the protrusion of the mucous membrane alone should be referred to the head of hæmorrhoids. Dr. BUSHE remarks, as to its *diagnosis* from hæmorrhoidal tumours, that the semilunar form of the flaps, the extent of their base, our ability to glide the folded membrane between the finger and thumb, as well as the absence of erection and hæmorrhage, are sufficient to distinguish this form of protrusion from hæmorrhoidal tumours. He adds, in respect of *intus-susception* of the rectum, that, in cases of *protrusion*, a probe, or the finger cannot pass higher than the border of the internal sphincter, owing to the doubling of the mucous membrane, while in *intus-susception* no resistance is offered to the passage of either the one or the other.

82. iii. The *prognosis* of prolapsus ani varies with the age and other circumstances of the patient. In *children* it is generally soon cured; or becomes less and less frequent as the child advances in age. In adults and old persons, it is a much more severe and obstinate complaint; and more readily and frequently recurs. In old prolapses considerable changes take place in the rectum and anus. A discharge of mucus is almost constant, the prolapsed mucous membrane becomes indurated, loses its villous surface; and sometimes ulcerates, especially when the sphincter is relaxed, and when the patient is subject to much straining at stool.

83. iv. The *causes* of prolapse of the rectum in *childhood*, amongst whom this complaint is most frequent, are the irritation of teething, or of ascarides in the rectum; diarrhoea occurring during or after weaning; insufficient or unwholesome nourishment; attempts to dispense with a healthy nurse; general or local debility and relaxation of the pelvic viscera; violent screaming and straining at stool, especially when produced by purgatives which irritate the rectum, as calomel, &c.; stone in the bladder; sitting on cold seats, and exposure of the loins to currents of cold air, occasioning a partial paralysis of the muscular coats of the rectum and sphincter.

84. The causes which most commonly produce this malady in *adults* and aged persons, are those which frequently occasion hæmorrhoids, or proctitis (§§ 35. 36.), and whatever weakens the tone of the sphincter ani and the attachments of the rectum to adjoining parts; the improper or frequent use of relaxing enemata or lavements; the neglect of the sub-acute or chronic forms of proctitis, especially when they are attended by much straining at stool; residence in hot and unhealthy climates; the several forms of diarrhoea and dysentery, especially the chronic; thickening, induration, and polypous excrescences of the inner coats of the bowels; hæmorrhoidal tumours, and other organic changes of the parts; stone in the bladder or disease of the prostate gland; prolonged costiveness; intestinal worms; protracted self-pollutions; sudden or violent muscular efforts; previous injuries and operations implicating the rectum or anus; and injuries or diseases affecting the dorsal or lumbar spine.

85. v. The *treatment* of prolapse of the rectum should be regulated according to the *cause*, and the *age*, and other circumstances of the patient. The *first* object is to return the protrusion; the *second* is to prevent the recurrence of the prolapse. — (*a.*) The *first* is generally accomplished with ease when the prolapsus is only partial; but when it is complete, or consists of the whole parietes of the bowel, the reduction of the protruded part is often difficult. But, by pressing up the parts nearest the opening of the bowel first, and directing the pressure upon and in the direction of the opening, much less difficulty will be experienced. If the swollen, reddened, and inflamed state of the prolapsed part, or spasm of the sphincter, or both, prevent the reduction, the application for a short time of a piece of muslin on the tumour wetted with equal parts of tinctura opii and sulphuric æther, and allowing a rapid evaporation so as to produce a quick transfer of heat, I have never known to fail in many cases in which I have advised it in cases of the complaint in children.

86. (*b.*) In order to prevent a return of the complaint, the cause should be investigated, and the remote as well as the more immediate causes removed or counteracted. The numerous surgical writers who have entertained this subject, have advised various operations, which are more or less painful, and not always devoid of risk; and these operations have not always been preceded by a sufficient trial of those medical and rational means, upon the failure of which only they should be resorted to. Partial prolapse, or that form of the complaint which is consequent upon neglected or prolonged hæmorrhoidal affections, is often complicated with chronic inflammation and thickening of the inner coats of the bowel, or with torpor or obstruction of the liver, and obstinate congestion of the hæmorrhoidal vessels; and unless these be removed by appropriate means, the prolapse will return frequently, and at last become almost constant. In these, as well as in several other circumstances of the complaint, PLUMMER'S pill, with soap, and taraxacum should be given at bed-time; and the bi-tartrate, tartrate or acetate of potash, in the morning and mid-day, either in a decoction of Achillæa millefolium, or of the taraxacum, or in the compound decoction of scoparium, in doses sufficient to keep the bowels sufficiently open. After these have been taken some time, and if the excretions have then acquired a natural appearance, cold injections into the rectum, each containing about a drachm of the muriated tincture of iron, or two or three drachms of the spirits of turpentine to half a pint or twelve ounces of the vehicle, will generally be of great service. These injections may be repeated according to circumstances; but care should be taken to preserve the secretions and excretions in a healthy and free state.

87. (*c.*) In *children* especially, and when the prolapse is complete, the treatment should be more constitutional than local, or the latter ought to be in aid of the former. The means should be directed to the form of general disorder; and tonics, especially those containing the preparations of iron; cold salt-water, or sea-bathing, the douche of salt-water, or weak brine, on the loins, followed by active exercise; the cold medicated injections just mentioned; the muriated tincture of iron taken internally, preserving at the same time the bowels gently open, or at least preventing costiveness; and attention to suitable, light, and nourishing diet, avoiding bulky innutritious vegetables, will rarely fail in preventing a return of the protrusion. If the complaint be associated with intestinal worms, the treatment should be directed accordingly, the injection containing the turpentine, or an occasional draught with a moderate dose of this substance, and an equal quantity of castor oil, will produce a very decided benefit. In the more obstinate, or prolonged cases, after returning the protruded bowel, and adopting the above treatment, the patient should retain the horizontal posture for some time; and after using cold-bathing or the cold douche, he may cover the loins with the emplastrum thuris comp., and have recourse to such means, medicinal and dietetic, as will promote the general health. When the above measures are unavailing, then the operations advised by surgeons may be adopted; for an account of which I must refer the reader to the works referred to in the BIBLIOGRAPHY, especially to those by FERGUSON,

BRODIE, DUPUYTREN, BUSHE, CHELIUS, and SOUTH.

88. VII. EXCRESCENCES ABOUT THE ANUS AND POLYPI OF THE RECTUM are analogous affections. — *A.* The former sprout from the skin and mucous membrane adjoining the anus; and assume various forms, to which different names, as *sycoma*, *figus*, *mariscæ*, *cristæ*, *verrucae*, *porrus*, *condyloma*, &c., have been given. These excrescences are caused by friction, erosion, the irritation produced by morbid secretions and by neglect of personal cleanliness, and by specific poisons. They are prevented by avoiding these causes; and, when fully developed, they are best treated by the local application of strong solutions of iodine, or nitrate of silver, or of hydrochlorate of ammonia, or of bi-chloride of mercury, or other appropriate means. If these are inapplicable or are inefficient, excision or ligature becomes necessary.

89. *B.* *Polypi* are not infrequent in the rectum, and, like the same formations in other situations, they present either a *mucous* or a *sarcomatous* structure. — *a.* Dr. BUSHE considers the mucous species to be most common; M. SANSON the sarcomatous. M. STOLTZ (*Gazette Médicale de Paris*, 1841, p. 253.) states that they are much more frequent in children than in adults; and that, while they occasion protrusion of the rectum, they are often confounded with that complaint. Their intimate structure has not been exactly ascertained. In children, they present more of a mucous homogeneous structure; whilst in adults they have more of a fleshy or spongy structure. In a case which was removed by my directions, the polypus had a serous-like cavity containing a little clear fluid, the walls being apparently amorphous. I have never observed any possessing a fibrous structure. Polypi of the rectum vary in their size, situation, and insertion. They may vary from the size of a pea to that of an egg: they may have a very broad, or a very narrow base or pedicle. They may be seated near the verge of the anus, or high in the rectum. These surfaces also vary; but they have generally the mucous aspect, a pale reddish hue, are rounded or oval, and are either smooth or equal, or more rarely lobulated. The mucous membrane appears thickened at or around the point of insertion. More than one may exist in the same case.

90. *b.* The *symptoms* produced by rectal polypi are different according to their seat and size. If low down, the polypus will protrude with *faecal* evacuations, or even remain protruded. It may be the cause of partial prolapse of the gut, and it may be mistaken for prolapse, whether occurring independently of, or complicated with, that complaint. When high in the rectum, it may not be recognised until an examination be made. When it is near the verge of the anus, it soon becomes external, and continues in this state. In rare instances the bowel and sphincter contract so forcibly as to strangulate and detach it. When it is seated high in the bowel, it may not be readily distinguished from an invagination, although, in this latter, the aperture of the invaginated part may be felt, if the displacement be within reach. The polypus rarely advances to a considerable size without causing costiveness, and colicky pains in the course of the colon, with tenesmus. The

straining is often distressing, but is attended by much less pain than when it is caused by inflammation. The evacuations, when soft, are contracted, flattened, and generally smeared with mucus and blood, or pus, so as to lead to the supposition of stricture of the rectum; an examination, however, readily determining this point. When the polypus increases in size and malignancy, the patient becomes sallow, and loses his appetite; his tongue is coated, and his thirst constant. Emaciation, oedema of the lower extremities, and hectic fever supervene. *Faecal* evacuations are procured with difficulty, are scanty, and commonly not without the aid of clysters. Tenesmus and weight in the rectum increase, and are attended by lancinating pains. There is much muco-purulent discharge, and often considerable hæmorrhage. If blood exudes from the surface of the polypus, and if it cannot be readily distinguished, on examination, from an invaginated portion of intestine, the diagnosis between them becomes difficult; but the symptoms of the latter are much more acute, and *faecal* obstruction much more complete, than those of the former, whilst polypus in the rectum is a much more protracted malady.

91. *c.* The *treatment* of rectal and anal polypi is the same as that usually adopted for polypi in other situations. Surgeons are divided in opinion as to the propriety of removing them by excision or by ligature: much may depend upon their seats and attachments; and probably, in the majority of instances, they should be removed by both — by ligature and excision just below the ligature; but let the surgeons decide this point.

92. VIII. CONTRACTION OF THE ANUS. — (*a.*) This lesion is seldom observed; but it has occurred owing to the following local changes: — 1st. By the contractions of a cicatrix either just within, or just without, or implicating the verge of the anus; — 2d. By the deposition of lymph, which has become more or less organised in the submucous cellular tissue, thereby forming a ring around the anus; — 3d. By the production of lymph on the mucous surface of the lower portion of the rectum, which becomes somewhat organised, either forming filamentous bands, or narrowing the outlet both by its thickness, and subsequently by the contraction to which, like other false membranes, it is liable; — 4th. By the various changes consequent upon chronic inflammation of the internal membranes, or of hæmorrhoidal tumours, or of veins, especially irregular thickening, induration, and cartilaginous transformation. These changes nearly approach one of those next to be noticed, and differ from it only in implicating the anus, more or less, instead of being seated in the rectum entirely. The *symptoms* of this alteration are those of permanent stricture of the rectum, the nature and seat of lesion being readily ascertained by an examination.

93. (*b.*) The *treatment* should be adapted to the change occasioning the contraction; but in every circumstance the bowels ought to be kept gently open, inflammatory action should be subdued, and tumours, hæmorrhoids, or other associated lesions removed. Mechanical dilatation should be cautiously adopted, after these preliminaries have been effected.

94. IX. STRICTURES OF THE RECTUM. — The rec-

tum is subject to two kinds of obstruction affecting its parietes, and narrowing its canal, — the one is *spasmodic*, and occasional; the other is *organic*, and permanent until removed by treatment. — *A.* Mr. MAYO remarks, as to the part of the rectum which is the seat of *spasmodic stricture*, that no single point is more liable to this affection than another. The cases which he has met with have impressed him that the upper part of the rectum and the sigmoid flexure of the colon are most liable to irregular contractions of their muscular tunics. — (*a.*) This complaint, especially when seated thus high in the bowel, is independent of fissures or ulcers in or near the anus; these lesions, however, frequently produce spasms of the sphincter and lower portion of the rectum, which are most severe or painful during and after the passage of a stool. Spasmodic stricture occurring thus independently of fissure or ulceration near the anus, is most common in debilitated constitutions, and in nervous and irritable temperaments, and as a sequela of dysentery. It is apparently *excited* by the vitiated state of the biliary and intestinal secretions and excretions. The frequent or habitual recourse to purgatives, especially to those which excite or irritate the lower bowels, cannot fail of predisposing to this form of stricture, when it does not produce chronic inflammation or hæmorrhoids.

95. (*b.*) The *treatment* of spasmodic stricture of the rectum ought to be chiefly dietetic and regimenal. The biliary and intestinal secretions and excretions, with the several digestive functions, should be improved and promoted by means suited to the existing disorder; and the lodgment of vitiated secretions and fæcal matters prevented by means of emollient, anodyne, and antispasmodic clysters. I have found these, and pills consisting of ipecacuanha, Castile soap, inspissated ox-gall, and sometimes also the extract of henbane, or of hop, taken twice or thrice daily, with due attention to diet, and regular exercise in the open air, remove the disorder in a few days or weeks.

96. *B. Organic or permanent stricture of the rectum* results from chronic inflammation, which, however, may have been associated, at one time or other, with additional lesions. — *a.* It consists of a partial thickening of the sub-mucous coat of the bowel and of the connecting or adjacent cellular tissue; through which means a smooth ring is formed, generally from a third to half an inch, more rarely to an inch in depth, which projects into and narrows the canal. Sometimes the thickening does not include the whole circle of the intestine, but a segment only. The ordinary seat of organic stricture is from two and a half to four inches from the orifice of the gut. But sometimes it occurs higher in the bowel — at six or seven inches from the anus; and a contraction of the same nature is occasionally also met with in different parts of the colon. (MAYO.)

97. *b.* The *symptoms* of stricture of the rectum generally come on slowly, unless the complaint follow acute or sub-acute proctitis. In other circumstances, or when it is, as most frequently, the consequence of chronic irritation or inflammation, the more urgent symptoms are slowly and gradually increased; and the obstruction is often very considerable before the patient has recourse to medical advice. There is always a sense of obstruction and weight in the lower bowel, which

are not relieved effectually by attempts at evacuation; uneasiness, distention, and occasional spasmodic or colicky pain in the abdomen; pain in the sacral region, often advancing to the loins and extending down the limbs; itching and heat about the anus; frequent eructations and flatulent distention, with oppression at the præcordia; bearing down in females, and nervous irritability; headache, and dejection of spirits; and a vitiated state of the alvine secretions and excretions. When the disease has continued for some time, the hæmorrhoidal vessels often become congested, and tumours form near the anus, produced by extravasated blood, which in old cases occasion thickening and elongation of the skin about the anus. Owing to the local irritation and determination of blood, inflammation, passing on to suppuration, sometimes attacks the cellular tissue near the anus, forming abscesses, terminating in fistulæ. (BUSHE.)

98. The calls to stool are sudden, inefficient, and often amount to six, eight, or twelve in the twenty-four hours — generally two, three or more taking place within a very short time. They are attended by much straining, which sometimes, if the stricture is high in the gut, gives rise to protrusion of the mucous membrane. Much flatus, and a small quantity of mucus, occasionally mixed with blood, are often all that is evacuated; but every two or three days fæcal matter, in small pellets of hard; and in long, round, angular, or flattened portions, of small diameter, if soft, is discharged. After each attempt, although the pain is very moderate, a sensation continues as if the bowels had not been emptied; and this being actually the case, several successive attempts, with only slight effect, are usually made in quick succession. When a sufficient quantity of fæculent matter and mucus is evacuated to afford some relief, the patient desists with fatigue, until a sense of fulness, weight, and tenesmus requires another effort. Occasionally the accumulation of fæces above the stricture, by irritating the mucous surface, causes an increased secretion from this surface; and the fæces, being thereby rendered more fluid, pass more readily through the stricture; and the accumulation is thereby either partially or altogether removed. If the stricture be not very high in the rectum, it may be reached by the finger, especially if the patient strains during the examination; but if it cannot be reached, the bowel should be sounded by the instrument recommended by Sir C. BELL, which consists of an ivory ball, mounted on a stalk of whalebone.

99. In some instances, many years may elapse without the patient's general health being materially impaired, notwithstanding the fæcal retention and daily sufferings. Ultimately, however, he loses his appetite, and becomes pale, emaciated, and hectic. At last purulent matter, so acrid as to excoriate the anus, is discharged in great abundance, and frequently it comes away when he coughs or stands erect. These symptoms increase until life is exhausted. (BUSHE.) — Some patients die before the disease arrives at this stage, owing to the obstruction and fæcal accumulation: they become distended with flatus; breathe with difficulty; are distressed by singultus, and all the symptoms of ileus. The pulse is very frequent, small, irregular, or intermittent; the extremities

are cold, are seized with cramps; and ultimately the features, which were previously anxious, are collapsed, and cold perspiration, restlessness, &c., usher in dissolution.

100. Dr. BUSHE remarks that, in a few cases, the stricture is partially destroyed by ulceration; but the portion of rectum immediately above it is more frequently thus affected. In these the intestine may communicate, by means of adhesion and ulceration, with the bladder in the male, and with the vagina in the female, thus forming a recto-vesical or recto-vaginal fistula, through which the fæces may pass. A much more common consequence, however, of the ulceration, especially when the ulceration is low in the gut, is the passage of fæcal matters into the cellular tissue, forming stercoraceous abscess, passing into fistulæ, which may vary in number from one to a dozen, especially in females. The ulceration may, also, after causing adhesions to another portion of bowel, open into it; or, failing of producing adhesions, open into the peritoneal cavity, and rapidly terminate by occasioning general peritonitis.

101. *c.* The *diagnosis* of organic stricture of the rectum is not without importance; for lesions of adjoining parts, as well as other lesions of the gut, may be confounded with stricture. —(*a.*) *Retroversion*, or *enlargement of the uterus*; disease of the *prostate gland*; and *tumours* in the vicinity of the rectum, may simulate stricture by pressing upon and obstructing the canal of the viscus, by rendering defæcation difficult, causing figured stools, tenesmus, mucous discharge, and fulness or weight in the sacral and perineal regions. In these, an examination will disclose the nature of the complaint; and not the less readily, when painful chronic affections of the vagina occasion symptoms resembling stricture of the rectum, owing to the contiguity of situation and nervous communication. —(*b.*) *Ulceration* of the rectum, or *fissure* of the anus, with *spasm* of the sphincter, can hardly be mistaken for stricture, if the state of the stools, and the remarkable pain attending the discharge of them, receive due attention; but these lesions may co-exist with stricture, and then a careful examination can alone determine the presence of the complication. —(*c.*) Stricture of the rectum may be mistaken for a *sarcomatous tumour* growing into the bowel, owing to the pressure of the stricture downwards by the fæces accumulated above it. A careful examination per anum will generally lead to the detection of an opening admitting the point of the finger, and demonstrating the nature of the lesion. —(*d.*) The *malignant affections* of the rectum will be distinguished from the organic stricture now being considered, by the sallow or leaden and cachectic hue of the countenance and surface; by the lancinating paroxysmal pains, and the rapidity of the ulcerative process.

102. *d.* The *causes* of stricture of the rectum are very frequently only those which have been enumerated in connection with *proctitis* (§§ 35, 36.), especially when these causes have been in frequent or prolonged operation. The complaint is very rarely observed before the adult age, or after the 60th year; and it is nearly equally frequent in both sexes. Mr. COPELAND thinks that women are oftener affected than men. Dr. BUSHE treated eight cases in females and seven in males.

Stricture is obviously the consequence of previous disease — of chronic dysentery, diarrhœa, &c., — of slow inflammatory action, or of the frequently repeated irritation of purgatives on the lower bowels. In some cases, the cause can hardly be determined.

103. *e.* The *treatment* of organic stricture of the rectum is chiefly surgical — consisting in great measure of mechanical dilatation. I cannot, however, see wherefore a lesion commencing so frequently in chronic inflammation, consisting principally in thickening of the connecting cellular tissue from the deposition of coagulable lymph, and passing into ulceration, should be so entirely or even chiefly treated by mechanical means. Much certainly depends upon the amount of change existing in the bowel; but the effects obtained from these means are not always satisfactory; and, if due discretion as to their adoption, and caution in their employment be not exercised, increased pain and irritation, general distress with shiverings, sickness at stomach, colicky pains, and even peritonitis, may follow a recourse to them. In many instances, where bougies have been injuriously employed, the application of leeches to the anus, and mild laxatives and anodynes, would have afforded more or less relief; for I have no doubt that the constant state of emptiness in which the lower bowels are kept by purgatives, mercurials, and injections, in the usual treatment of those affections so generally ascribed to stricture, and the irritation produced by bougies are no mean agents in actually producing or aggravating the complaint which they are intended to remedy. The *nimia diligentia* is commonly too conspicuous, with whatever intention it may be dictated. There can be no question as to the impropriety of preventing the lower bowels from experiencing that state of healthy distention necessary to antagonise the contractions of their circular fibres. All hollow canals contract inordinately, even to the extent of obliteration, when they are deprived of the natural antagonism produced by their contents. I have generally found, that persons who were subject to stricture of the rectum, had been, for a long period previously, in the habit of taking purgatives, which kept the lower bowels almost constantly in an empty and irritated state. At an early stage of the complaint, more benefit will arise from the use of such means as will remove inflammatory irritation, and allow the fæces to become the natural and daily dilator of the incipient constriction, than from those measures which are commonly recommended, and often too officiously employed. Nevertheless those measures are frequently requisite, and are often successful in experienced and cautious hands.

104. In early stages of the complaint, after prescribing the treatment advised for the chronic states of proctitis (§ 38.), an evacuation from the bowels should be obtained every day, or every other day, by mild aperients taken by the mouth, or by enemata. The laxatives which I have preferred in these cases have been castor oil, olive oil, manna, magnesia with sulphur, the confection of senna, the bitartrate of potash with bi-borate of soda, or the compound infusions of senna and gentian. The injections should not be too frequently administered unless the obstruction be such as to occasion dangerous fæcal accumulation above the stricture, and they ought to

consist chiefly of emollients and laxatives, as soap with olive oil, the bi-borate of soda in the decoction of marsh-mallows, and similar relaxing and soothing substances.

105. When it is determined upon to have recourse to instruments for the removal of contraction of the rectum, the fact should not be overlooked, that these contractions generally result from chronic inflammation, and that the change thus produced, unless it has gone on to fibro-cartilaginous induration, disposes the part to laceration when even a slight dilating force is used; the sound adjoining parts readily yielding, whilst the contracted parts are as readily torn. Nor should it be forgotten that there is an intimate consent between the mucous canals of the pelvis and the peritoneum, injury of the former, especially mechanical injury, not infrequently exciting peritonitis, although the violence is sustained at a part of those canals which are not covered by peritoneum. A recourse, therefore, to bougies and other mechanical means of dilatation should be had with caution. As to this topic, and as to recourse to division of the stricture, I must refer the reader to the surgical authorities contained in the *Bibliography*.

106. X. INVAGINATION OF A PORTION OF THE UPPER PART OF THE RECTUM, WITH OR WITHOUT CONTRACTION, occurs in rare instances. — *a*. When stricture takes place at, or near to the junction of the rectum and sigmoid flexure of the colon, the pressure above may carry the obstructed part down into the relaxed and dilated portion below, and thus produce either an incomplete, or a complete invagination, although the stricture of the invaginated part be very slight. When the rectum is much dilated, or is in that relaxed or paralysed state described above (§§ 12. *et seq.*), the upper part, or a portion of the sigmoid flexure of the colon, or both, may thus be forced downwards, or invaginated, even although no actual stricture of these parts exists. This state of disease has been noticed by Mr. CHEVALIER, Mr. EARLE, and Mr. MAYO. The last of these writers remarks, "that it originates in great laxity and dilatation, which is liable to be produced by frequent large accumulations of fecal matters in the rectum." When the bowel is in this condition, the upper part of it is liable to be invaginated, or to form a prolapsus within the lower. The prolapsed part, whether consisting merely of a fold of the internal membranes, or of the whole parietes of the bowel, soon becomes inflamed, thickened or indurated, and the opening through it contracted; so that the symptoms and distress are thereby greatly aggravated.

107. *b*. The *symptoms* of this lesion are often ambiguous. But imperfect action of the bowels, frequent and ineffectual efforts to void the feces, discharges of puriform mucus, and aching pain, weight, and tenesmus in the sacral region, are most commonly complained of. As there is generally a capacious sac below the invaginated or contracted part, feces may accumulate there, the watery portion being absorbed, and the fecal part thereby rendered more consistent. The stools may thus be discharged nearly of their natural quantity and appearance, and the nature of the complaint may hence not be ascertained, unless an examination by the finger or speculum be properly made.

108. *c*. The *treatment* consists of the exhibition

of gently aperient medicines; or rather of the combination of tonics with aperients, as of the compound infusions of gentian and senna; or of rhubarb and inspissated ox-gall; and of oleaginous enemata. In this, as well as in other affections of the rectum, the decoction of *Achilleæ millefolium* may be taken as follows, and may even be administered as an enema, omitting the tinctures and salts: —

No. 330. R. *Achilleæ millefolii*, 3ij; *Aquæ*, ℥xxiv. Coque per partem horæ quartam, et cola. Liquori colati adde Bitart. Potassæ, 3ij; Sodæ Bi-boratis, 3j; Tinct. Aurantii et Tinct. Cardamom. co. aa, ʒss. M. Fiat Mist.: cujus capiat coch. iij. vel iv. ampla, bis terve in die.

Subsequently astringent injections, especially those with the terebinthines or balsams, may be prescribed; and such mechanical means as the case may require be resorted to, more especially properly adapted bougies or tubes.

109. XI. CANCER OF THE RECTUM. — *Scirrhus contracted rectum*. — *Carcinoma of the rectum*. — *A. Malignant disease* may attack the rectum only, or both it and the anus, or it may commence in or affect chiefly the anus. Dr. BUSHE states, that it presents chiefly the cartilaginous, lardaceous, and encephaloid forms. The cartilaginous degeneration may commence either as hard tubercle on the mucous coat, or in the muscular tunics of the bowel, this latter being the most common. The muscular fibres become pale and firm, and the connecting cellular tissue undergoes a similar process of condensation, without alteration of colour. As the morbid process goes on, this tissue often becomes lardaceous; and the walls of the bowel increase in thickness, and the cellular and muscular coats are sooner or later softened and confounded each with the other. Sometimes the mucous tunic is studded with lardaceous and encephaloid vegetations, while the serous coat presents cartilaginous tubercles. The lardaceous degeneration is thus superadded to the cartilaginous, but the one may occur without the other; and the muscular and cellular coats may be lardaceous, while the mucous tunic throws out encephaloid growths. The encephaloid degeneration is sometimes primary, commencing in the cellular tissue or mucous coat, but more commonly it is consequent upon the cartilaginous or lardaceous.

110. Any portion of the rectum may be first attacked, but the junction of the rectum with the sigmoid flexure of the colon, that immediately above the pouch, and the anus, are the parts most commonly affected. Adjoining organs are also frequently involved in the disease, especially the recto-vaginal septum, the os and cervix uteri, and the urinary bladder. The malady, instead of being seated in the rectum, may attack the colon, either in or near the sigmoid flexure, or considerably above that part, or in some other portion of the bowel. It may even co-exist in the rectum with malignant disease in some other situation, as in the stomach or pylorus. The physical changes in the parts are, according to Mr. MAYO, contraction, a peculiar induration of the parietes of the bowel, thickening, and ulceration of the mucous surface. The induration results from the scirrhus degeneration of the muscular and cellular coats, the diseased parts assuming different appearances, according to the quantity and character of the morbid formation. In one variety, "the thickening is inconsiderable, but the mucous

membrane is abraded, the muscular coat is hard, firm, gristly, and the canal of the bowel is narrowed. The muscular fibre is partly converted into, partly contained in, firm, gristly, fibrous substance." This form of the disease does not generally extend to the anus, but commonly begins from one inch to one inch and a half within this part, and occupies from four to five inches of the bowel, terminating abruptly upwards, and more gradually towards the anus. Another or fungoid variety is characterised by considerable thickening, caused by a greater amount of scirrhus deposit than in the preceding. The scirrhus stricture is grey, fibrous, not quite opaque, much looser, and more succulent and lardaceous or fungous in parts, than in the former kind. Fungoid cancer, at its commencement, generally occupies a portion only of the circumference of the bowel, and is felt as a hard tumour situated about three inches within the gut, and commonly upon its anterior surface, with the mucous membrane as yet unbroken. The morbid growth extends in each direction, upwards to the flexure of the colon, and downwards so as to implicate the anus, and to throw the anal integument into hard knots. This form of the disease is that which is most frequently found in parts of the large intestines above the rectum. In either form, the adipose tissue external to the rectum becomes firmer and more crisp, as seen in the same tissue around a cancerous mamma.

111. According to the view of this malady taken by M. CRUVEILHIER, cancer may commence in any part of the rectum, and may assume any form of the cancerous degeneration, from the scirrhus induration to the soft medullary fungus, or encephaloid, or any, or even every form, may be blended in the same case. In women, among whom it is most frequently seen, it is often a mere extension of cancer of the uterus, or rather of the vagina, the disease affecting the recto-vaginal septum in such a manner as to render it difficult to determine in which canal it had commenced. It very rarely thus appears to commence simultaneously in the rectum and urinary bladder in men. M. CRUVEILHIER thinks that cancer of the rectum is mostly a local disease; but this is the case only at its commencement, or at an early stage, before the cancerous contamination of the blood and frame generally has taken place.

112. *B. Symptoms.*—Malignant stricture of the rectum is more frequently met with than the simple thickening and induration already noticed (§§ 96. *et seq.*). Whatever may be its particular characters,—whether scirrhus, sarcomatous, lardaceous, fungoid, or encephaloid,—it encroaches upon and narrows the canal of the rectum, so as more or less to obstruct faecal evacuation, and occasion great and constant distress. The patient complains of a dull, fixed, or aching pain at the upper part of the sacrum, with severe shootings, or sharp exacerbations, extending down the limbs, with violent tenesmus, and a sense of weight or bearing down in the part, especially after evacuations, or whatever may cause irritation of the part. Bloody purulent matter, or a puriform sanies, is passed with the stools, which are thin and frequent. In the fungoid variety, discharges of blood may be large and often. Mr. SYME remarks, that though in the early stage difficulty may be experienced in passing the faeces, owing

to the thickening of the coats of the gut, yet there is for the most part ultimately rather an inability of retention, from the action of the sphincter being impeded by the progress of the disease.

113. At an advanced stage, the countenance and general surface display more or less of the appearance of malignant cachexia, or a sallow, leaden, or greenish-yellow hue; and flesh and strength are lost; the blood also becoming deficient. On examination per anum, the bowel is found contracted, thickened, and irregular on the surface. The affected parietes are hard and unyielding, and morbid growths are felt projecting into the cavity; in some places in the form of rounded tubercles, in others with rough or ulcerated depressions. These changes may not feel very different to the touch from those which attend simple stricture, excepting in their greater degree; and hence more reliance is to be placed upon the symptoms indicative of malignancy, than upon the sensations furnished by the examination. The acute, lancinating, and paroxysmal pains, extending to the loins, pubis, and thighs; the sense of weight, aching, and numbness in the sacrum, loins, hips, &c.; the aggravation of these upon standing or walking; the irritability of the bladder, or incontinence or retention of urine; the more frequent and larger discharges of blood than in simple stricture; the bearing down sensation, especially in females; and the general cachexia and anæmia, as the disease advances, sufficiently indicate the malignant nature of the malady. Ultimately hectic, exhaustion, abdominal tenderness, hiccup, vomiting, &c., usher in dissolution.

114. *C. Causes.*—This disease may occur at almost every age. Mr. MAYO has seen it as early as twelve years of age. It is most frequently met with between the ages of thirty and sixty. The encephaloid is the variety which is met with early in life; the scirrhus and lardaceous at more advanced periods. Women are certainly more subject to the malady than males, and more especially after the cessation of menstruation. Some local injury, as a blow on or near the part, has sometimes appeared to excite the disease; but generally the particular cause has not been recognised; and it is not improbable, that the tendency to the complaint has arisen out of a constitutional vice or tendency.

115. *D. The treatment* of this malady is very unsatisfactory. But, although it admits not of cure, unless in those rare cases in which the anus only is affected, and even in these most rarely, and at an early stage, much may be done in palliating the symptoms, and even in prolonging life. The encephaloid or fungoid variety generally runs a rapid course, especially when it is attended by frequent discharges of blood; whilst the more cartilaginous, scirrhus, or lardaceous form may last for years. Diluent, emollient, and anodyne injections are generally requisite in this state of disease, in conjunction with those means, internal and constitutional, which I have advised for cancer in other parts. (See art. CANCER, § 29. *et seq.*) Sir B. BRODIE recommends opiate injections, and injections of linseed oil, either in a pure state or conjoined with limewater, with the view of allaying irritation; he gives alkalies internally, with balsam of copaiba; and he very justly considers the preparations of opium to be indispensable, notwithstanding the inconveniences attending the

use of them. Suppositories of conium or of henbane, or of both conjoined, or of opium with camphor, Peruvian balsam, or zinc ointment; mucilaginous injections, containing the chloride of zinc or creasote, with the solution of opium or syrup of poppies; and such laxative, emollient, and anodyne enemata as the state of the case may suggest, especially those with warm olive oil, with small quantities of camphor or balsam, will generally afford considerable relief. According to Mr. CALVERT, much benefit is derived from "carefully introducing a hollow tube of elastic gum, through which the fæces are drawn off by injecting tepid water."

116. Of internal remedies, I can add nothing to those recommended for cancer in another place. (See art. CANCER, §§ 29. et seq.) The preparations of iron with narcotics, especially the *mistura ferri comp.*, with liquor potassæ, *tinctura conii*, or *tinctura opii*, or *tinctura camphoræ comp.*; or the iodide of iron in syrup of sarza; or the *pilula ferri composita* with the *pilula saponis cum opio*, may be prescribed and varied according to circumstances. As to resorting to excision of the part when the disease is limited to the anus or lower portion of the rectum, the determination should depend upon the peculiarities and complications of the case. This subject is well discussed in the surgical works referred to, and in Mr. COOPER'S Surgical Dictionary.—(For other diseases connected with the rectum and anus, see articles DIGESTIVE CANAL, INTESTINES, HÆMORRHOIDS, HÆMORRHAGE from the Bowels, and DYSENTERY.)

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RHEUMATISM. — SYNON. — *ῥευματισμος*, a defluxion—from *ῥευματίζω*, to be affected by a fluxion, from *ῥέυμα*, a fluxion, and that from *ῥέω*, I flow;—*Rheumatismus*, Pliny, Sydenham, Vogel, Juncker, Sauvages, Cullen, Pinel;—*Dolores Rheumatici*, Hoffmann;—*Myositis*, Sagar;—*Myitis*, Chrichton;—*Arthrodynia*, Cullen;—*Febris Rheumatica*, Auctor. Var.;—*Arthritis Rheumatica*, Swediaur;—*A. Rheumatismus*, Parr.;—*Cauma rheumatismus*, Young; *Arthrosia Acuta et Chronica*, M. Good;—*Gliederfluss*, *flusskrankheit*, Germ.;—*Rhumatisme*, Fr.;—*Reumatismo*, Ital.;—*Rheumatism*, *Rheumatic fever*, *Rheumatic pains*.

CLASSIF. — Class 1st., Febrile diseases;—Order 2d., Inflammations with fever (Cullen). — Class 3d., Diseases of the sanguineous function;—Order 2d., Inflammations (M. Good);—III. CLASS;—II ORDER (Author in Preface).

1. DEFINIT. — Severe pains preventing, or remarkably aggravated by, motion of the affected parts; apparently seated in the fibrous structures, chiefly of the large joints, the aponeurotic expan-

sions, and the fibro-serous surfaces; arising from external or manifest causes, and assuming various forms and complications—being sometimes remarkably acute, febrile, or inflammatory, and shifting their situations, often sub-acute, and oftener still less acute, non-febrile, unattended by heat or swelling, of chronic duration, and accompanied with debility or stiffness of the affected limb.

2. Although rheumatism is, owing to geographical and social circumstances, one of the most prevalent diseases in the British Isles, yet is it one, respecting the nature and treatment of which there exist the greatest diversity of opinion, and the least amount of undisputed knowledge. The remarkable prevalence of the malady, this diversity of doctrine, and the several very important pathological relations suggested to the thinking physician by every manifestation of rheumatic affection, are sufficient to direct investigation to the subject with greater energy than has hitherto been bestowed on it, and with more success than has hitherto signalled it.

3. Rheumatism was not described, or even noticed as a recognised malady, by the ancients, either by this term, or by any other, to which the assemblage of symptoms thus denominated can be traced. Yet the word is sometimes found in their writings, although it does not altogether represent the disorder to which the moderns have applied it, this name having been given by the former to affections, to which they attached the idea of a humoral defluxion, conformably with its derivation, especially to those characterised by mucous or pituitous discharges.* One of the earliest writers amongst the moderns, who employed this term according to its modern acceptance, treated of the subject in connection with *catarrh*, an affection to which rheumatism is closely allied, and with which it is often complicated. (See J. VIGIER, *Tract. de Catarrho Rheumatismo*, &c., Geneva, 1620. In HALLER's *Biblioth. Méd. Pract.*, t. ii. p. 376.) SYDENHAM, however, was the first to treat fully of rheumatism, and to distinguish it from gout, with which it had been frequently, if not generally, confounded by former writers under the name of *Arthritis*. Subsequently BOERHAAVE, HOFFMANN, and JUNCKER, described the disease with tolerable accuracy; but it was not until the end of the last, and the commencement of the present, century that the various metastases and pathological relations of rheumatic affections received even a partial notice.

4. I. DESCRIPTION.—Various forms of rheumatism have been described by authors, or rather several states of disorder, more or less intimately allied to each other, have been ranked as varieties of this disease, although certain of them might have been placed, with greater propriety, under a different category,—thus the pains in a limb or limbs caused by organic disease of the nervous

centres, and the sympathetic pain produced by hepatic congestion, &c., have been often mistaken for rheumatism, and described and treated as such. Since, or at least soon after, the first notice of rheumatism as a distinct disease, two remarkable forms of it have been admitted,—the *acute* and *chronic*. Recent observation has recognised the varieties of the complaint and the pathological distinction between certain of its states, with greater accuracy; but there has been a greater disposition also among observers to multiply distinctions than to point out alliances, and pathological relations. The *division* most generally adopted of the forms of rheumatism has been that founded upon the severity and duration of the attack. It is almost identical with the foregoing, the term *sub-acute* being employed to mark intermediate states of severity. If the division into *acute*, *sub-acute*, and *chronic* be not arbitrary, it is at least conventional; but it has this recommendation, that it is simple, and involves not theoretical or pathological doctrines, nor necessarily suggests ideas as to the seat and extent of morbid changes, which vary remarkably in their associations and concomitants, in different cases, and even in the same case at different periods.

5. More recently, a pathological division has been attempted, in which distinctions are based on conditions that are contingent, varying, and uncertain; and qualitative or adjective terms have been applied as distinctive of varieties, derived from the names of the tissues, which are assumed to be the seats of the particular forms of the malady; thus we have had rheumatism denominated *capsular*, *muscular*, *periosteal*, *neuralgic*, &c., the meaning implied being that the capsules of the joints, the muscles, the periosteum, &c. are the seat of disease in each of these varieties which are respectively thus designated—an assumption at the best, and requiring proof even as respects the partial affection of these tissues, as will appear in the sequel. Instead, however, of adopting a division which is more specious than real, I shall take the one already very generally employed, and which is the most convenient for practical purposes, namely, the *acute*, the *sub-acute*, and the *chronic* forms of rheumatism.

6. i. ACUTE RHEUMATISM. — *Febrile Rheumatism*. — *Rheumatic Fever*. — *Inflammatory Rheumatism*. — This form of the disease is generally ushered in with rigors, or shiverings, or chilliness, followed by increased heat, and the usual febrile symptoms of an apparently inflammatory or sthenic character. Co-ordinately, and often contemporaneously, with chills or rigors, severe pains, impeding or altogether preventing motion, are felt in the limbs, affecting chiefly the joints or aponeurotic expansions, or tendinous sheaths, and sometimes extending in the course of the muscles, &c. As febrile reaction is established, the tongue becomes furred or loaded; thirst urgent; the pulse quick, open, bounding, and full; the bowels confined; the skin hot, at first dry, but afterwards perspiring freely; the urine scanty, high-coloured, depositing no sediment, and very acid; the appetite impaired; and sleep prevented by the aggravation of the pain, during the nocturnal exacerbation of fever. The seat and character of the pain vary in different cases; and even in the same case in different periods. Generally, at first, the pain is confined to the large joints, as the knees, ankles, elbows, shoulders; or to the

* “Si HIPPOCRATEM, GALENUM, ARETÆUM, PAULUNQUE ÆGINETAM Græcos, sive CELSUM, AURELIANUMQUE Scriptores Romanos accuratè evolveris, quod hunc morbum indubitatè designat, nihil dilucidè enodatèque descriptum invenies. PLINIUS (l. xxii. 47. 68., l. xxv. 39. 47.) quidem Rheumatismum nominavit, morbum eo nomine non omnino attigit. Sunt tamen apud eos loci, qui tamen invidiosam quasi obiter indicant, quippe qui εἰ πυρετὸν ποτὶδὲα et διαθεσὶν ρευματικὴν, et alia hujusmodi nomina indidant. Quæ res quidem, hunc morbum antiquioribus nec prorsus ignotum fuisse, nec dum tam frequenter, quàm hodie, ob oculos venisse, nobis planè demonstrat.” — (J. Copland, *De Rheumatismo*. Svo. Edin. 1815.)

aponeuritic expansions covering the large muscles; or it extends to both the joints and these expansions, attacking them either simultaneously or in quick succession. Less frequently parts of the trunk of the body, as well as one or more limbs, are so severely affected as to render the patient helpless and almost motionless. The pain, according to its situation, is most acute, severe, plunging, tearing, burning, gnawing, girding, tense, or lancinating; it is more or less constant, but exacerbated at intervals, and during the night, and by the slightest movements of the affected parts, or even by touching or pressing them, so that the pressure of the bed-clothes is hardly endured. When the joints are chiefly affected, the acute pain is often followed by increased heat, and after a time sometimes by an erythematic blush of inflammation, but more generally by swelling, rendering the joint fuller, rounder, and more manifestly swollen. The swelling is owing either to serous effusion and capillary fulness of the cellular tissue external to the fibro-serous tissues of the joint—the chief cause of it in acute rheumatism; or more rarely to serous effusion within the cavity of the joint, which more frequently occurs in the sub-acute form of the complaint. Neither the redness nor the swelling is followed by suppuration, unless in cachectic or scrofulous habits of body; and even in those, not until erosion or ulceration of the cartilages of the affected joint takes place,—an event most probably produced by changes in the fluid effused into the cavity, during low grades of vital power or reaction.

7. In acute rheumatism, the fever is sthenic or inflammatory, more in appearance than in reality, and generally presents the usual concomitants of this fever, with remarkable severity of pain, which is always disposed to shift its place; this disposition even being the greatest, or occurring most frequently, when the exacerbation is the most severe. All the febrile symptoms, and even the pain itself, manifest more or less of a *remittent* character. This circumstance is of importance as respects both the nature and the treatment of the malady. The pulse is excited, broad, open, bounding, compressible, and sometimes full; varying commonly from 84 to 100 during the day; but rising generally to 96 or even up to 112 during the night. In some cases, slight chills usher in the evening exacerbation of fever; and occasionally the symptoms are more severe on alternate days, especially in some localities. The veins are generally full, and blood taken from them furnishes a firm coagulum covered by a firm, thick, buffy coat, which by its contraction from the circumference renders the upper surface of the coagulum more or less cupped. This state of the blood continues, notwithstanding the frequent repetition of bloodletting, the coagulum becoming smaller in relation to the amount of serum. (See §§ 60. *et seq.*)

8. The secretions are all impaired or changed at the commencement. The tongue is either loaded or furred, or both; the mouth is clammy and dry; and thirst is generally experienced and increased during the night. The bowels are confined, unless fecal accumulations have formed from neglect, when they may become loose from the irritation thus produced. The urine continues scanty and high-coloured until the febrile action begins to subside, when it deposits a copious sediment, of a

brownish-red colour, resembling brick-dust. The skin is dry at first; and generally continues dry during the day and early part of the night; but as the nightly exacerbation of pain remits towards morning, the skin becomes moist, and a profuse perspiration breaks out; but without any remarkable or permanent alleviation of the pain. The perspiration is generally unctuous, emitting a peculiar acid odour; and continues profuse for a considerable time, especially if the patient is placed between blankets, or partakes freely of warm diluents. In this case, the perspiration may throw out a milary eruption on the skin.

9. These symptoms, if not affected by a perturbing treatment, or if no internal metastasis occur, generally continue about fourteen days, or even longer; when some mitigation of their intensity occurs. Although the pains have subsided, still the patient feels them when he moves the affected parts; and they generally return, but in a less severe form than before, during the night. The parts affected, even when the pain has disappeared, continue very weak, and the patient is indisposed to use them, from a feeling of inability to exert them. The frequency of the pulse and the other symptoms subside: the urine is more abundant, paler, and more turbid on cooling, and deposits a sediment; but the perspiration often still continues unctuous and offensive, and more or less profuse. If the fecal evacuations and biliary secretions now become copious and natural, the urine more abundant, less acid, the sediment more copious, and the sweats more free, less unctuous, and have less of an acid and offensive odour, the nightly exacerbations being more slight, or nearly disappearing, the disease subsides favourably, and debility chiefly characterises convalescence; which is the more rapid and the less likely to be followed by the sub-acute or chronic states of the disease, or by relapse, the more fully the several secretions are restored; the cleaner and more natural the tongue, and the more completely the primary and secondary assimilating functions are discharged. If, on the contrary, the amendment stops half way—if it be arrested, the tongue continuing loaded, or furred; the urine acid or scanty, or much loaded; the perspiration offensive, enfeebling, and unsatisfactory; and the pulse still frequent, this state of the disease will generally pass into the *sub-acute* or *chronic*, or into both in succession, and in either these forms continue an indefinite period.*

* The following description is more minute, as respects certain points, than the above:—

“Hicce morbus ab horribus plerumque sensuque lassitudinis; interdum et a frigore incipit. . . . Antequam febris, aut ulla ejus indicia accesserint, ægroto plerumque per triduum quadriduumve, loca certa aliquantum dolent. Indicia tamen febris unum aut alterum diem dolores constantes nonnunquam præveniunt. Dolor, qui alios alio pacto, nec eundem eadem ratione semper occupat, febre ingravescente excruciat. Partes tamen quibus nervi, vi movendi e voluntate præditi, suffunduntur, et cœli mutationibus objectas, potissimum infestat. Quapropter membrorum superiorum inferiorumque, ut et dorsi et cervicis musculi articuli que, maximè Rheumatismo laborant. . . . Articuli majores plerumque dolent: dolor aliàs unum et alterum, aliàs plures quoque angit; nec in articulos solum, verum etiam in musculos aponeurosesque tendinosas imperium exercet: movendo adaugetur: et partis dolentis rigiditas sentitur. In hoc morbo dolor nunquam constans, nisi ubi nulla neu minima quidem febris calore comitata adsit: nec eo tempore nisi quandam certum locum obtinet. Veruntamen, ut notæ febris augentur, huc illuc ex alio in alium per musculos locum transiliunt dolores

10. ii. SUB-ACUTE RHEUMATISM. — *Rheumatismus sub-acuteus*, — *Semi-acute rheumatism*, *Rheumatismus semi-acuteus*, FOWLER. — This variety of the disease may be merely a sequence of the acute; or it may occur primarily. In either case, it is a state of disease intermediate, as respects severity, duration, &c., between the acute and chronic, the term sub-acute being used conventionally to mark the grades or phases between the more extreme forms of the complaint. When the sub-acute state appears primarily, it is very seldom ushered in by either chills or rigors; nor is it attended by well-marked fever, unless at night, when more or less, often only a slight degree of fever and heat of skin are experienced, generally commencing in the evening and going off with perspiration in the morning; and during this febrile period, the pains are generally most severe. The pains are felt in either the extremities, the trunk, or head, — most frequently at first in one limb, and then in another, or in two or more joints of the same limb; as the knee and the ankle, or the elbow and wrist; more rarely both knees, or both ankles, or elbows. In some instances the pain flies from one joint to another, affecting different articulations, or aponeurotic expansions, in quick succession, as at an early stage of acute rheumatism; but in other cases it is stationary for some time, either in the joint or the limb, or the part of the trunk in which it is either at first or soon afterwards seated.

11. This form of the disease, although differing from the acute, chiefly in the mildness of the symptoms generally, is not altogether without fever. During the evening and night, the pulse generally rises from 70 to 80 or 90 beats, becoming also fuller and broader, and the heat of skin is increased. During the night, thirst is often complained of, and the mouth is somewhat dry and clammy. The tongue is white, or loaded, or furred. The alvine excretions are scanty and

morbid; the urine is scanty, dense, high-coloured, very acid, and deposits a pink or brick-dust sediment. When the patient falls asleep, or towards morning, the skin becomes covered with a warm unctuous perspiration; and he is remarkably susceptible at all times of cold, even when he is hot in bed; and if he be at all exposed to currents of air, the pain often is aggravated, or it shifts its seat, or the joints become more stiff and painful. Although the bowels may not be remarkably constive, the biliary secretion is seldom healthy, the liver evincing more or less torpor, with retention of the secretion in the ducts and gall-bladder. The appetite is somewhat impaired; and digestion slow or difficult, and attended by flatulence. Even when the patient is able to move about during the day, the aggravation of the pain, and the presence of fever, during the night, may be such as to deprive him of sleep, or to allow him only broken slumbers, especially towards morning, for a long or indefinite time — generally for a period prolonged beyond that of acute rheumatism, or for several weeks. At last, the disease is either subdued, or it lapses into the chronic, but it is rarely superseded by an acute attack.

12. Sub-acute rheumatism is seldom accompanied by redness of the affected part. More frequently there are heat and swelling; often swelling without marked heat of the part; and then the patient complains of stiffness, and even of coldness of the joint. It is not often that more than two parts are simultaneously affected with this form of the disease; and it is more fixed in a part than acute rheumatism; and is much less disposed to metastasis. It is often, however, remarkably obstinate; and seldom evinces any disposition to amendment until the excretions are improved and the tongue becomes clean. In this form of rheumatism, also, the blood taken from a vein is often more or less cupped or covered by a buffy coat.

13. The *sub-acute* is one of the most frequent forms in which rheumatism occurs in the *dark races*, whether in the eastern or in the western hemispheres, the disease rarely assuming in them the truly acute character. It is one of the most prevailing diseases among the natives of the various countries of the East, and among the native troops in the service of the East India Company. The symptoms and progress of this form of the complaint are the same in these races as they have been now described. Mr. MALCOLMSON, whose remarks on this disease as observed among the sepoys are very instructive, states, that “the pains are worse in bed; but whatever may be the case in Europe, it is not the heat of the bed-clothes that causes this, as they come on frequently when the sun gets low, and continue for the early part of the night.” This remark confirms what has been stated above, that the exacerbations of the pain are intimately associated with the return or aggravation of the febrile symptoms; this connection admitting of a ready explanation when the *causes* of the disease come under consideration, especially those which are dependent upon locality and climate.

14. iii. CHRONIC RHEUMATISM. — *Rheumatismus Chronicus*; *R. Diuturnus*; *R. Longus*, Author. — This form of the disease may follow either the *acute* or the *sub-acute*, these gradually lapsing into the chronic state; or this last state may be the primary disease, proceeding directly from the

alium ex alio appetentes, et unde exorti, eodem recepti domicilium figunt suum.

“Febris ejusque habitus huncce morbum comitans, sub vesperem ingravescit; dolor per noctem penè opprimit, quo tamen tempore sedem mutare assolet. Nec verò dolor semper nec pyrexia se invicem ex æquo subsequuntur; signa enim febris, ut e plurimis exemplis liquet, nequaquam augeri videntur.

“Inter ægotandum sudores sæpè partes, rari quidem et raro totum perfundunt corpus; nec sublevant angorem nec ægion proferunt; verum-enimverò dum cæterum corpus multo perfunditur sudore, pars, quæ dolet, sæpènumerò siccescit; sæpè tamen inter morbi discessionem, articulus discruciatu sudoribus plurimis suffunditur. Postquam dolor aliquamdiu duraverit, pars corporis parùm sincera tumescere, nec ita multò post, rubescere incipit. Plurimum tamen tumoris sub specie œdematosa sine ullo rubore, frequenter adest. Partes, in quas Rheumatismus acutus imperium exercet, semper dolent, tactionemque refugiant. Inflammatio tumorem, de quo memini, subsecuta, haud exiguum doloris partem sæpè submovet. Sub hac forma statuque, hicce morbus in circiter decimum quartum diem durat; nec exempla desunt, in quibus modò in alteras aut etiam paulò ampliùs extenditur, modò plures nundinas superat.

“*Terminatio.* — De illa Rheumatismi acuti forma, quæ felicissimè decedit, nihil est, cur multùm moremur; autem observandum est febris indicia, plerumque sub diem decimum quartum sensim decrescere: dolorem ipsum obtusiorē et constantiorē factum minùs mordere: unum et alterum articulum tantummodò afficere, et paucis post diebus ex toto quiescere: hoc pacto Rheumatismum nonnunquam, sæpè febrem ultrò desinere. Dolorem, nullà medicorum ope adhibita, rariùs abire: in uno et altero etiam exemplo dolorem febremque sub idem tempus inveniri desinere; illum autem febris signa longè frequentius subsequi.” — (*J. Copland, De Rheumatismo, pp. 7–9.*)

causes usually producing either of the forms of the complaint already described. I have remarked that the term sub-acute is merely conventional, and is intended to convey the idea of some intermediate state between the acute and chronic: hence, whilst it may be difficult to distinguish between the acute and sub-acute conditions, in many cases of the disease, it may be equally difficult to distinguish many instances of the chronic from the sub-acute. There cannot, owing to the nature of morbid actions, in relation to peculiarities of constitution, be any line of demarcation drawn between either. If it were possible to Daguerreotype disease, the likenesses even of the same malady taken in the numerous cases and phases in which we observe it, would hardly furnish two or three of them quite alike, however numerous might be the portraits obtained. How strenuous soever may be our endeavours to state the truth — to describe with accuracy phenomena which vary not only in different cases, but even also in the same case at different periods — we can only approach to the truth; and, even to make a tolerable approach, numerous circumstances, states, changes, and things must be mentioned, which, to the superficial and unthinking, may appear unnecessary or irrelevant. The terms *acute*, *sub-acute*, and *chronic*, in relation to rheumatism, must not be viewed as marking either *dynamic conditions*, or *peculiarity and limitation of seat*, or *duration of disorder*, local or constitutional, or certain *qualifying properties*; but these collectively, in connection also with *grades of severity*, between which grades, thus associated, and otherwise *variously complicated and characterised*, no line of demarcation can be drawn, however minute and conventional may be the subdivision; each state, condition, variety, or form insensibly passing into that which is the nearest to it in the scale of morbid action or structural change.

15. *A.* When chronic rheumatism succeeds to the acute or sub-acute, the febrile symptoms attending these forms have subsided, and with them the severity of the pain. The secretions and excretions, especially the alvine, have, however, not returned to a natural or healthy state; and the tongue and mouth are generally dry and clammy in the morning, the former being also more or less loaded. The pains* in the limb or

* "Dolor obtusè angit: movendo exardet: articuli ipsi obtusam et perpetuam molestiam sentiunt: frigent; neque cætero corpore sudoribus diffuente, sudant; sin sudent, sudoribus frigidis et tenacibus perfunduntur. Verùm in eodem loco dolor plerumque constat, frigore multùm adactus, calore vel tepore quoque imminutus; præsertim si lecto æger recumbat. Rheumatismus longus premendo levatur, degravatur acutus."

"Longus plerumque maximos corporis articulos, humeros scilicet et coxas, nec dorsum rarè invadit: Quum his in corporis partibus aliquamdiu permansisset, in alias transiit. Pars, quæ doluerit, morbo amoto, imbecilla et rigida per diu manebit, et in superiorem dolorem, cæli si intemperies quidquam moveatur, faciliè incidet. Rheumatismus etiam longus, statas remissiones si excipias, aliquot menses, vel annos, immo et maximam vitæ partem, hoc pacto exercebit."

"Partes dislocationibus, luxationibus et contusionibus antea laborantes, vel prioribus ægrotationibus debilitatas, partibus antea integris prætermisissis, infirmare solet. Rheumatismus dorsi coxæque musculos aggressus, ne amoveatur, multùm renititur, et tunc quidam sexum masculinum quàm muliebri sæpius ag-greditur."

"Dici non potest ut longus in acutum permutetur. Quidam, qui istuc sæpius inciderint, ibique diu laboraverint, ad articuli hydropem sæpe perveniunt. Manifesta quidem res est, membri imbecilitatem affecti, et remissionem exhalantium quæ in ligamenta capsularia

joint assume more of an aching, gnawing, or boring character; and sometimes, instead of being aggravated at night, as is most frequently the case, they are often relieved by the warmth of bed. They are commonly now more fixed and continued, or less remittent; but much less severe, and are most frequently experienced in the shoulder, elbow, knee, and ankle; in the occipital or cervical region, in the lumbar or dorsal region, and in the ischio-gluteal region; in the wrists; and in various other parts, according as they may have been most affected previously, or exposed to external causes. Frequently, however, the pain remits in the morning or during the day, and returns with evening or night; but this in some measure depends upon the causes or circumstances of the case. If the part had previously been the seat of increased heat, redness, or swelling, these, especially heat and redness, have entirely disappeared before the chronic state had supervened, although slight swelling may still remain. As the disease continues, the pains generally abate, or intermit; exacerbations or returns of them occurring frequently from vicissitudes of temperature, weather, or slight exposures. The parts, however, still remain for some time stiff or weak, especially if the biliary and intestinal secretions be scanty or disordered.

16. *B.* When chronic rheumatism appears primarily, and often also after acute or sub-acute attacks, there is neither redness, nor increased heat, nor swelling of the affected part; sometimes there is even greater coldness than natural. The pain is dull, aching, or gnawing; often but slight, generally increased on motion, and attended by a feeling of weakness of the part. Frequently it is described as gnawing, boring, or merely a soreness, seated deeply, and affecting the bones. It is often remittent or intermittent; but it is often also continued, or almost constant, for a time. When it presents the former states, it is generally mitigated or removed by the warmth of bed, especially in the morning, and by a free perspiration. In some instances the pain is slight, rarely becoming severe; but although slight, it is attended by pain on motion, or a feeling of weakness, or inability of motion, when first attempted; and yet, when the attempt is made energetically, and continued so as to accelerate the circulation and promote a free perspiration, the pain is relieved or altogether removed for a time. When chronic rheumatism is thus primary, it is generally alleviated by pressure and by warmth; and it most frequently attacks, unless in cases where currents of cold air, or other causes, have acted directly on the affected parts, those joints or places which had previously been the seats of dislocation, contusions, or other serious injuries.

17. *C. Chronic Rheumatism of Joints — Chronic Rheumatic Arthritis — Chronic Rheumatic Gout. — Arthrodynia*, CULLEN. — *Rheumatic Nodosities of the Joints*, HAYGARTH. — The causes of rheumatism, when acting chiefly upon a joint

ferant, necessariam inde exortam eam excitare. Hydrarthrum quoque in scrofulosorum articulis sæpè gignit. Rheumatismus prælongus prægravisque articuli ἀρχυλωση nonnunquam afficit."

"In sectis horum cadaveribus, qui diu sæpiusque hoc morbo laboraverint, quique eodem (qui quidem perpauci sunt) obierint, articularum membranæ crassescunt et adhærescunt; quasi glutinamentum tendinum thecis infunditur." — (*Op. cit.* pp. 10—13.)

or extremity, often occasion a chronic state of the disease remarkable for its obstinacy, and often serious as respects the consequences. After exposure to cold and humidity, or to currents of cold, humid, and miasmatic air, a joint, especially the knee-joint, the ankle, the hip-joint, elbow, or shoulder, is attacked by a sense of gnawing, aching, of soreness, fulness, stiffness, and an incapacity of moving without acute pain, or an increase of these feelings. The complaint generally continues for weeks, and, if neglected during this time, often for months, either without alleviation, or becoming much worse; the patient ultimately being unable to extend the affected limb, at least without extreme pain. The soreness, stiffness, and pain generally extend from the joint, along the fibrous structures, to a greater or less extent, the limb thus becoming the seat of severe pain. This form of rheumatism may continue for months, and at last give rise to disease of the cartilages of the joint, and its usual consequences. One of these is absorption of the cartilages, and the deposit of a smooth, ivory-like substance. Dr. CRAIGIE observes, that although this form of the disease commences in the aponeurotic expansions, it is disposed to pass from these to the periosteum, and to produce chronic morbid action both in it and in the interior of the articulations. This action occasions the removal of the synovial membrane and cartilages, and deposits in their place a porcelain-like substance, polished, but devoid of the elasticity of cartilage and of secreting power.

18. This is one of the most common forms of the rheumatic disease. It has been most ably treated of by Dr. TODD. Mr. ADAMS has denominated this affection "*Chronic Rheumatic Arthritis*," and has given a minute description of the lesions produced by it. Dr. COLLES, Mr. WILMOT, Mr. CUSACK, Mr. R. SMITH, and M. CRUVEILHIER have also devoted much attention to this very important form of chronic rheumatism. Dr. TODD justly remarks, that this affection of the joints, even when most severe, rarely causes immediate destruction of the articular textures: suppuration or ulceration seldom occurs; and when they do, he thinks that they proceed from a venous inflammation coming on in the course of the disease. The joints, however, do not always escape without serious change; for not only may the disease run on, uninfluenced by any mode of treatment, but exertions of the limb, and the painful use of the affected joint, may induce inflammation in its usual form, if it had not even previously existed, and all the effects which commonly follow it.

19. The immediate effects of the rheumatic complaint are commonly confined to the ligament of the joints, to the periosteum of the articular ends of the bones, and to the tendons of the muscles inserted into them; but these effects sometimes extend to the fibrous fasciæ. These textures, as Dr. TODD very correctly observes, become thickened, lose more or less of their natural flexibility, and I may add that they are impaired in their tonicity and vital cohesion. They are also more opaque. The synovial membranes are also thickened, evidently by an effusion of lymph in the synovial areolar tissue. In some cases the affection of the joints is followed by effusion of fluid into the synovial cavities; the

pain being aggravated by pressure, but more by motion. If the effusion be moderate, it may alleviate the pain; if it be very great, the pain is chiefly the result of distention, but is then rarely so severe as previously to the effusion. This affection is most common and most marked in the knee-joints; but although it sometimes is seated in both knees simultaneously, it is rarely equally severe in both. Dr. TODD very justly observes that these changes are seldom the result of a single paroxysm, but generally ensue from frequent attacks, or upon the long continuance of the rheumatic diathesis. In these respects, the analogy with gout he considers obvious. "And, although we have no evidence of such deposits in rheumatism as the chalk-stones of gout, there are abundant indications that rheumatic matter cannot be attracted to the joints in any quantity, or with frequency, without impairing to a material extent the nutrition of their textures." (p. 164.) Without, however, disputing at this place the existence of a "rheumatic matter," the alternative of a modified vital action—a morbid or altered condition of organic nervous influence and sensibility, and a consequent change of vascular action and of nutrition—ought not to be left entirely out of view.

20. The change of the articular cartilage, which I have briefly noticed above, is very fully described by Dr. TODD, who states that it consists of a process of absorption, taking place slowly, during the commencement of which this tissue appears to divide into a number of fibres, vertical to the surface of the bone. This change resembles that produced by long maceration of articular cartilages; and depressions or grooves may be seen which gradually enlarge, unite, and leave portions of the bone uncovered. As the articular surfaces of the bones are thus deprived of their cartilaginous coverings, the pressure and friction sustained by them cause them to assume a smooth and polished surface and appearance, resembling that of very dense polished ivory. Whilst the absorption of the cartilage, and the consequent change in the articular surface of the bones are proceeding, the bones themselves near the affected joint become enlarged, chiefly by an exuberant ossific deposit around and near to the articular extremity, causing both some deformity and a mechanical obstacle to the movements of the joint. These osseous deposits are seen irregularly about the joint, and vary in shape and size. The alterations in the synovial membrane are also remarkable. This membrane is thickened and prolonged at various points into fringes or villous processes, which are soft, and of a red colour, and dip into and completely occupy depressions around the neck of the bone. Small cartilaginous bodies, of an irregular shape and size, are sometimes found in rheumatic joints. They are either loose in the cavity of the joint, or attacked by pedicles formed by the synovial membrane to the inner surface of the ligaments, or to the articular surfaces. These changes cannot, I conceive, be ascribed to inflammation, but rather to a morbid nutrition, consequent upon altered organic nervous sensibility and influence in the joint, and upon the morbid state of the synovial secretion.

21. This disease of the joints, generally consequent upon prolonged and repeated attacks of

chronic rheumatism, is most prominently manifested in the hip joint; and, as occurring in this situation, it has been described by SANDIFORT, BOYER, B. BELL, and, more recently, by Mr. ADAMS, Mr. R. SMITH, Mr. CANTON, and Dr. TODD; but, as the last-named writer remarks, this disease does not spare any of the joints. It affects all the large joints; and it has been met with in the hands and feet; in the temporo-maxillary joints, and in some of the vertebral articulations. It may show itself in early life, as well as at more advanced periods; but it is most common after thirty years of age, and amongst the labouring poor who are much exposed to vicissitudes of season and weather.

22. This form of the disease may affect several joints, but whether one or more joints, it is more rarely even remotely consequent upon acute or sub-acute rheumatism, than upon repeated attacks, or it has followed several returns of the more chronic affection. The painful symptoms characterising this form are aggravated at night, and by vicissitudes of weather, especially by easterly winds, by cold and humid states of the air, and by derangement of the biliary and digestive organs; and they often extend to adjoining parts.

23. When the *hip-joint* is the seat of this disease, both the acetabulum and the head of the femur become altered in shape, the former being deeper and wider than natural, the latter being flattened and expanded, and assuming a turnip-like shape, or being lengthened into the form of a cone. "Both surfaces are deprived of cartilage; the fatty body, which in health occupies the non-articular portion of the acetabulum, and the ligamentum teres disappear; and the eburnation is apparent to a greater or less extent over both articular surfaces. There is more or less of the exuberant osseous growths around both the acetabulum and the head of the femur; but the most remarkable feature is, that the neck of the femur is shortened, so that the position of its head with respect to its shaft is sometimes considerably altered. So remarkable is the change in the general shape of the upper extremity of the femur, that a bone thus altered has been not infrequently mistaken for an example of united fracture of the neck of the femur." (TODD, p. 174.)

24. In this disease of the hip-joint, the affected limb is much shorter than the other, and the patient appears lame. Sometimes he merely rests the toes on the ground; and if he comes down on the sole, he appears the more lame. The foot is wasted, as in fracture of the neck of the femur. As rotation is so painful as to be almost impossible, walking is attended with circumduction of the pelvis with the affected limb, the muscles of this limb being more or less wasted, and the nates of the same side flattened. The weight of the body on the affected joint occasions much pain in it; whilst the reclining posture affords ease. Mr. ADAMS states that this disease, when fully established in the hip-joint, rarely or never extends to the other articulations, and doubts its rheumatic origin in some instances. Dr. TODD remarks, that in some of the cases traces of rheumatism have not been apparent in the previous history; but that he has not himself met with a case in which complaint has not been made of pains of a rheumatic

character in some of the other joints, although further signs of disease of the articular textures were wanting. Mr. ADAMS admits that this disease may have a rheumatic origin; but that falls on the great trochanter often give rise to the first symptoms. This, however, is no proof of the independence of the disease of the rheumatic diathesis; for the fall may be only the exciting cause or determining agent of the local affection. This form of rheumatism of the hip-joint attacks much more frequently the male than the female sex; whilst chronic rheumatism of the hands most frequently affects females.

25. Chronic rheumatism of the hands often produces much deformity of them. All the joints are liable to be affected, and the fingers are generally most deformed. "Besides the wearing away of the cartilages, the ossific growths, and the ivory-like surfaces, the joints become dislocated, and the fingers are drawn more or less out of their natural position; they are generally drawn forcibly over towards the ulnar side of the hand, overlapping each other, the innermost fingers being in a state of flexion." The extremities of the metacarpal bones are often much enlarged, and the carpus preternaturally convex in the dorsal aspect, owing to thickening or distention of the synovial bursæ. Both hands are generally affected, and sometimes also other joints. Dr. HAYGARTH states that the disease is almost peculiar to women, and commonly appears about the period of the cessation of the menses. Out of thirty-three women in whom he observed it, only three had it during the period of regular menstruation. It first appeared, in most of the cases, between the ages of fifty-one and sixty; he observed it only in one man. (See *Op. cit. on Nodosity of the Joints*, p. 152.) I have, however, seen three instances of this affection of the hands in females between the ages of thirty and forty-five, and in all these the catamenia were irregular, generally scanty and difficult.

26. IV. OF THE LOCAL AND STRUCTURAL STATES, OR THE SPECIAL SEATS OF ACUTE AND SUB-ACUTE RHEUMATISM.—It has been ably contended by Dr. F. HAWKINS, and more recently by Dr. MACLEOD, that rheumatism presents certain differences, according as it is seated in the *fibrous* or in the *synovial tissues*. Dr. HAWKINS thus distinctly states this doctrine, and in so lucid a manner as to deserve especial notice. In the *first class* of tissues, he ranks, 1st, those which serve to connect parts together, as the tendons and ligaments, and the aponeurotic expansions of tendons; and, 2dly, those which divide and envelope particular organs, as the muscular fasciæ and enveloping aponeuroses; the periosteum; the fibrous coats of the nerves; the membranes which have on one side a serous lining, as the dura mater and pericardium; also the fibrous sheaths of the tendons and capsules of those joints which are provided with fibrous capsules, and the ligaments surrounding other joints; and the membranes which have a mucous covering spread over them, &c. In the *second class* he includes,—1st, the sub-cutaneous bursæ, to which the epithet *mucosæ* has been improperly added;—2dly, the synovial sheaths of the tendons;—and, 3dly, the synovial capsules of the joints.

27. A. In the *first class* of structures, the fever and constitutional disturbance are much greater

n proportion to the degree of local inflammation than in the other; and Dr. HAWKINS considers that the heart and pericardium are chiefly prone to sympathise with the affection of the fibrous structures.

28. *B. Rheumatism of the second, or synovial class* of textures, is indicated by the situation, the degree, the character, and the form of the swelling, which is much greater, and occurs earlier, than that which is caused by rheumatism of fibrous structures. The swelling in rheumatism affecting chiefly the synovial membrane is that of a circumscribed fluctuating tumour, modified by the surrounding ligaments. There can be no doubt of rheumatism being more acute, and more disposed to associate with it disease of the heart, where the fibrous tissues are its chief seat, than where the synovial structures are chiefly attacked, in which latter case the disease usually assumes a sub-acute form.

29. Dr. TODD remarks, that "some practical physicians have endeavoured to make a distinction between what they call synovial or bursal rheumatism and fibrous rheumatism. The natural history of the disease, however, does not warrant this distinction; for in no instances of rheumatic fever are the synovial membranes free from irritation—as evinced by the existence of effusions; and the synovial membranes can scarcely be affected without involving the fibrous tissues which surround, support, and convey the blood-vessels to them." There is certainly much truth in this remark; yet the distinctions made by Dr. HAWKINS are not without some foundation; for, although there is generally an extension of the morbid action from one tissue to another, or even co-ordinately to both, in some instances, nevertheless there is often a predominance of it in the one over the other. Viewing the rheumatic disease as altogether constitutional, although expressed more especially in particular structures, it cannot be denied that the disease assumes a more acute form, and peculiar and even more extensive associations, when predominating in non-secreting fibrous tissues, where no portion of the *materies morbi*, admitting this to exist, is effused, than when chiefly affecting a secreting surface allowing the effusion of a portion of the fluid, which fluid, when retained in the circulation, probably serves to aggravate, perpetuate, or even to complicate the attack; but, when effused, tends chiefly to aggravate or perpetuate the local affection.

30. That the fluid which is effused in the cavities of joints, during acute or sub-acute rheumatism, abounds in materials of an injurious tendency if they were retained in the blood,—that it contains more of a morbid material than in some other circumstances, is manifested by the sensible qualities of the secretions and excretions generally in this disease; and it is by no means improbable that the morbid effusion, especially when long retained in the cavity of the joint, and thereby rendered still more morbid, exerts an injurious effect upon the synovial membrane, upon the cartilages, and even upon the capsules and more external structures of the joints. One of the great errors of modern writers on rheumatism is the attempt to ascribe its several forms to a special affection of certain tissues,—to view the several varieties of the disease as resulting from their

respective local affections,—to consider a local and contingent manifestation of a constitutional malady as the malady itself—a local manifestation which is always various, constantly varying, differently associated, often singularly complicated, and which, however severe in any of its seats or complications, is the painful result of pre-existent morbid conditions of a much less sensible and obvious kind,—the local and more external expression of a constitutional malady to which our pathological investigations, as well as therapeutical indications, should be more particularly directed.

31. When the *synovial membrane* of the joints is the chief seat of acute or sub-acute rheumatism, the symptoms are not so acute, but more persistent than when the fibrous tissues are mainly affected. Although two, three, or more joints may be at first attacked, a more limited number, or only one, becomes the principal seat of the disease, and the effusion into the joint is often increased. It is extremely probable that the fluid then effused is not merely an increased quantity of synovia, but that this fluid is more or less altered from the healthy state, which alteration is increased by the retention of it in the affected joint. To this circumstance, and to the irritation thereby produced in the retaining and surrounding tissues, are to be imputed not merely the obstinacy and aggravation of the complaint, but also the structural changes in the capsule, in the cartilages, and even in the ends of the bones themselves, with the inflammation which either attends or follows those changes, especially in scrofulous, cachectic, or broken-down constitutions. When the effusion is within the capsule, there is more or less projection, owing to distention, of the more yielding parts, as shown when the knee-joint is affected, the swelling being more limited than when the more external parts, as the ligaments, tendons, and aponeuroses, are the chief seat of the disease, and often fluctuating; this phenomenon never occurring unless the effusion is within the capsule.

32. I have seen this form of rheumatism most frequently in the knee-joint. In more recent and in the more sub-acute cases, the structural changes produced by the disease may not extend much beyond an increased quantity of synovia, and more or less vascular injection and thickening of the capsule, especially of the synovial membrane. In a case alluded to by Dr. MACLEOD, which terminated fatally from another disease whilst subject to a first attack of this form of rheumatism, the alterations in the joint were very similar to the above. When, however, the attacks have been frequent, or when the disease has been persistent, or the constitution in fault, or when the patient has aggravated the attack by exertion or exposure, the changes in the capsules, the ligaments, the cartilages and ends of the bones are much more serious, owing to superinduced inflammation and the contingent consequences, as respects not merely these parts, but also those more external to the capsule and in the vicinity. That suppurative disorganisation of the joint is sometimes met with during, or consequent upon, acute or sub-acute rheumatism, cannot be denied; but there is great reason to infer that the inflammation, of which the disorganisation is the effect, has been superinduced, as just stated; and that

that issue is not limited to rheumatism attacking the capsule or more internal tissues of the joint, but is occasionally extended to those cases in which it is difficult to determine whether or not the amount of the rheumatic affection was greater externally or internally to the capsule. In two cases, in private practice, attended by Mr. FERGUSON and myself, suppuration of the knee-joint supervened; but this result was owing to the operation of the causes of inflammation subsequently to, or at least during the rheumatic attack, to unusual exertion of the affected limb, and to exposure. This termination of acute or sub-acute rheumatism of the joints should not be confounded with the *suppurative disease of the joints*, which is *secondary* of phlebitis, and which is not infrequent in females after delivery.

33. *C. Rheumatism affecting chiefly the Periosteum. — Periosteal Rheumatism.* — This state of the disease usually presents itself in a sub-acute or in a chronic form, more especially the latter; and is met with most commonly in impaired constitutions, in the cachectic and in the scrofulous. It affects those parts of the periosteum which is most exposed to the vicissitudes of temperature and weather, as those covering the tibia and ulna, the sternum, the cranium, and bridge of the nose. The disease is either attended by a slight degree of fever and aggravation of the pains at night, or is prolonged indefinitely in a chronic and non-febrile state. The pain is dull, constant, deep-seated, and referred to the bone. It is unattended by redness or evident swelling; but sometimes a slight fulness or thickening may be perceived upon a careful examination, and the pain is increased by firm pressure. The tongue, in these cases, is either loaded or furred, and the excretions are more or less disordered. The pulse is generally accelerated, often weak and compressible. That more or less thickening of the periosteum actually takes place, has been demonstrated on dissection of some of these cases. Dr. HAWKINS remarks, that this form of rheumatism is often allied with deep-seated pains, which sometimes continue fixed in the shoulder, and occasionally affect the hip. They are aggravated by any motion in the joint in any direction; which renders it probable that the fibrous capsules with which these joints are provided are here the seat of pain, and these capsules are closely interlined with the periosteum.

34. It is often very difficult to distinguish rheumatism affecting the periosteum from pains occasioned by *syphilis* or by the abuse of *mercury*. The previous history of the case should guide the diagnosis; but it may be inferred that the affection is rheumatic when the pains and the periosteal affection are decidedly local, or are confined to a single limb, or to defined portions of one or more limbs. Whereas the pains from the other causes now assigned are more dispersed or wandering, affect a greater number of places, and are seldom confined to one part until nodes are being, or have already formed. The nocturnal exacerbations are also much more severe when the disease is syphilitic than when it is rheumatic; and they moreover are generally associated with other signs of secondary syphilis. If the pains have been produced by the abuse of mercury, the swellings or enlargements of the periosteum are

more remarkable, more numerous, and more defined than when the disease is rheumatic.

35. *D. Rheumatism may affect chiefly the Fibrous Envelopes of the Nerves. — Neuralgic rheumatism. — Rheumatism of the nerves.* — This form of the disease is met with in the rheumatic diathesis, from the same causes as produce rheumatism, and often in alliance with rheumatism of other fibrous structures. Yet, although pains following the course of certain nerves, and produced by exposure to cold, may be viewed as being very closely allied to rheumatism, they should not be viewed as being altogether identical with it; but, in many instances, as more intimately connected with neuralgia or with neuritis. Nevertheless, the connections of these pains with either may obtain in different cases; the one affection passing into the other by insensible degrees. Neuralgic rheumatism is observed chiefly in the *sciatic nerve* and its branches. The attack generally commences in the loins, affecting one side chiefly or solely, extending down the corresponding limb, and occasionally reaching the foot. It occupies the posterior aspect of the limb, and follows the course of the nerve. The suffering is generally very severe, and is commonly increased at night; but it is seldom so distinctly periodical as neuralgic affections are; nor is the pain so sudden in its invasion and cessation, nor so transient as that of neuralgia. The symptoms often resemble those of incipient ulceration of the cartilages of the hip. (See articles NEURALGIA, § 35., and NERVES, affections of.)

36. Neuralgic rheumatism is sometimes seated in the nerves of the face, usually in consequence of exposure to currents of air; is often associated with other rheumatic complaints, and sometimes even alternates with rheumatic affection of the sciatic or other nerves. This form of rheumatism is often attended, at its commencement, by a foul or furred tongue, by acceleration of pulse, by disorder of the secretions and excretions, and by biliary congestions or accumulations. It may present a *sub-acute* character; but it is most frequently *chronic*, and often very prolonged, being of several months' duration.

37. *E. Rheumatism affecting chiefly the Aponeuroses, Muscles, or fibrous Tissues of the Loins and Back. — Lumbago.* — This form of the disease may be either *primary*, or *consecutive*, or *simple*, or *associated*. When it is *primary* it is sometimes *sub-acute*, but it is more frequently *chronic*, especially when it is *consecutive* of other forms of the complaint; and in this latter case especially it is often complicated with some other form of rheumatism, as neuralgic or sciatic rheumatism. Lumbago is often confounded with other complaints, these complaints, especially congestion of the venous sinuses of the lumbar vertebræ and its consequences, congestions of the kidneys, &c., being mistaken for lumbago. This form of rheumatism is sometimes but little painful unless the muscles of the loins are called into action, more especially if the action be sudden. Owing to this remarkable increase of pain on motion, the patient either remains at rest in his bed, or on a sofa, or he walks bending forwards, and is unable to raise himself quite erect.

38. When the pains in the loins are truly rheumatic, the lower limbs and joints are seldom affected; but when they depend upon congestion

of the venous sinuses of the lumbar vertebræ, or upon congestion of the kidneys, there are, in addition to more marked disorder of the urinary excretion, symptomatic pains, numbness, cramps, or pricking, or lancinating pains in the limbs, usually in both limbs, when the venous sinuses of the spine are congested; and in one limb, if only one kidney is thus affected.

39. Rheumatism sometimes affects not only the *lumbar region*, but also the *dorsal portion*, in some instances, and in others it apparently extends to, or has advanced from, the *ischial* or the *gluteal aponeurosis* to the *lumbar* or *dorso-lumbar aponeurosis*. It is doubtful, in these cases, whether the muscles or the aponeuroses are the seat of pain. I believe that the latter are chiefly affected, the contractions of the muscles inducing pain by stretching the affected aponeurosis.

40. *F.* There are various *other parts* of the body in which rheumatism sometimes appears, independently of those more *internal parts* which it sometimes attacks either contemporaneously with, or consecutively upon, an affection of the external structures. (See § 47. *et seq.*) Of the manifestations of rheumatism in these external parts, little notice is required at this place, as the more important topics connected with them are discussed under other heads. It is necessary only to mention what these localities are, and the usual forms in which the disease affects them.—*(a.) Rheumatism of the head,—Cephalalgia rheumatica,—Epicranial rheumatism.*—The rheumatic affection may appear either primarily or consecutively in the head, in a chronic or sub-acute, very rarely in an acute form. It may affect either side of, but very seldom the whole head; and it may be seated in the frontal and temporal regions, or in the occiput. It appears to be seated in the epicranial aponeuroses of these situations, and not in the periosteum. (See art. HEADACH—*Rheumatic and Arthritic*, § 29. *et seq.*)

41. *(b.) Rheumatism of the neck,—Cervical rheumatism,—Torticollis,—Crick in the neck.*—This, as well as the preceding local form of the complaint, generally follows the action of currents of cold air, or other kinds of exposure to cold, or to cold and moisture. The pain affects chiefly either the back or one side of the neck; and in this latter case the head is held to one side, or held awry, and is always inclined so as to relieve the suffering part. The neck is sore, stiff, and incapable of motion, unless with great increase of pain. This form of the complaint is often complicated with the preceding, and is apparently seated in the cervical aponeuroses.

42. *(c.) Rheumatism of the face,—Facial rheumatism,—Facio-temporal rheumatism.*—This form may be associated with either of the foregoing; and especially with rheumatism of the head (§ 40.). The pains may commence in either the temples or in the face, on one side, or in both at the same time. It is liable to be confounded with *tic douloureux*, or *neuralgia facialis*, or with toothach, with which latter it not infrequently alternates, or even is associated; the same exciting causes producing either or both. It is sometimes, also, complicated with severe attacks of catarrh, or with catarrhal fever; and, in rarer instances, it either is seated chiefly in, or extends to, the sclerotic coat of the eye, forming

rheumatic ophthalmia. (See EYE, *Diseases of*, § 96. *et seq.*)

43. *(d.)* Rheumatism may likewise be seated in, or extend to, the *aponeurotic investments* of the *intercostal muscles*, or these muscles themselves, according to the opinion of some writers. It has, in this situation, been usually denominated *pleurodynia*, or spurious pleurisy, under which head it has been considered. It may also affect the aponeurotic expansions, or fibrous tissues of any part of the *abdominal parietes*, although the disease is seldom observed in these parts. Its affection of, and metastasis to, *internal organs or structures* are considered in the sequel.

44. II. GONORRHOÆAL RHEUMATISM;—*Specific rheumatism.*—Rheumatism affecting chiefly the capsules of joints and the synovial membranes not infrequently occurs in the course of other constitutional and cachectic diseases, especially *gonorrhœa*, the venereal or mercurial cachexy, or other states of general taint. It is, however, only in connection with gonorrhœa that I have to view the complaint at this place.—*a.* The rheumatic affection generally supervenes upon gonorrhœa, about ten days, or a fortnight, or three weeks, from the first appearance of the urethral discharge, which usually is very much diminished, or has entirely disappeared, when the former is developed; and the one affection may alternate with the other, and become remarkably obstinate, especially when neglected at first, or injudiciously treated. The cause of rheumatism thus supervening upon, and more or less superseding, the gonorrhœal discharge, is not very manifest. The operation of the usual causes of rheumatism upon a constitution affected by gonorrhœa, and previously exhausted by seminal discharges, seems the chief source of the malady; but, in some instances, the exciting causes are not evident, the gonorrhœal infection both predisposing to and determining the rheumatic disease. Probably diathesis is much concerned in producing the attack, the gonorrhœa imparting the peculiar conditions by which this form of the complaint is characterised.

45. *b.* The symptoms of gonorrhœal rheumatism generally appear before the urethral discharge has altogether ceased. A severe aching is complained of in one or more joints. Of four cases which were under my care, three had the knees affected; the other the ankles, and bursæ of the adjoining tendons; but the affection was severer on one side than on the other. The pain soon becomes acute and burning, and affusion rapidly appears within the capsules and bursæ, which become much distended. The external surface is rarely or never reddened or inflamed. Motion aggravates the pain, which is much exasperated during the night, causing watchfulness. The affected limb is usually kept in a semi-flexed position, and either stretching or bending it greatly aggravates the pain. This form of the disease assumes either an *acute*, *sub-acute*, or *chronic* character; the last generally following the first or second. The *acute* is always attended by fever: in a case which I lately attended, the pulse rose above 120; but more commonly the febrile symptoms are less severe than in the usual form of the complaint, and assume more of a sub-acute character, and a truly remittent form. The tongue is loaded, the bowels confined, but not so obstinately as in other states of rheumatism; and the

urine is loaded with lithates. The perspiration is copious, and somewhat offensive. Dr. MACLEOD states that the skin presents a pulverulent deposit, which may be scraped off in sufficient quantity to be tested, and which consists of the lithate of soda. I have not observed this. In no instance which I have seen has the urethral discharge entirely disappeared, a very scanty gleety fluid still exuding from the urethra. Several surgical writers have noticed the alternation, or the succession of gonorrhœal ophthalmia and gonorrhœal rheumatism. I have seen it only in one instance. I have not met with a case in which this form of rheumatism was complicated with, or succeeded by, cardiac or any other internal affection. In one instance there appeared a slight delirium during the acute stage.

46. The course of this complaint is very prolonged, according to the usual mode of treating it. M. RICORD states that it generally continues many months. Although the more acute symptoms may soon subside, the sub-acute and chronic stages are most obstinate. Even when it has apparently disappeared, the complaint is apt to recur, generally in a chronic form, the urethral discharge returning during the intervals. In this way it may continue a long time, and even induce serious organic changes in the affected joint.

47. III. OF THE COMPLICATIONS, EXTENSIONS, OR METASTASIS OF RHEUMATISM. — Rheumatism, especially in its acute and sub-acute forms, is a more or less *external* manifestation of a constitutional malady, during the existence of which *internal* determinations also of morbid action may appear in similar tissues and structures,—or, in other words, the constitution, being affected in an acute or sub-acute form, will throw the morbid action on the periphery of the frame, without any internal complication in persons of strong vital resistance or unimpaired power; but in those of diminished energy or vital resistance, a somewhat similar state of morbid action is apt to appear in internal fibrous and serous tissues and surfaces, either contemporaneously with, or consecutively upon, the external affection. In these latter, the vital energy is insufficient either to throw off the morbid action on distant or peripheral parts, or to protect more central structures from the invasion of this action.

48. A. Of the several *associations, complications, and metastases of rheumatism*, there are none of greater importance, and of more frequent occurrence, than those in which the heart and pericardium are concerned. The *endocardium*, in certain of its reflections especially, and the *pericardium*, are particularly liable to be affected, either contemporaneously with, or consecutively upon, acute and sub-acute attacks of rheumatism,—the acute more especially. Of this complication or metastasis I have fully treated, when considering the diseases of the HEART and PERICARDIUM (§§ 129, 132, 133.), and to that article I must now refer the reader. That many cases of this *complication* present the heart as the primary seat of the disease is by no means improbable, especially in young subjects, inasmuch as I have often observed a fully developed state of cardiac affection at an early period. Dr. TODD takes a similar view of this association of the internal and

external disease, and believes that it is less frequently a metastasis than is usually supposed; and states that the occurrence of the cardiac affection “is inexplicable by the doctrine of metastasis, which supposes that the cardiac inflammation has been transferred from the limbs to the heart. The truth is, that the cardiac inflammation may be primary: it frequently exists at the same time with the articular affection, and dates its origin from the same period, as it derives it from the same cause.” (p. 116.) This remark is confirmatory of what I have stated at another place (see art. HEART, § 129.), and agrees with what I shall have to notice in the sequel.

49. Dr. GRAVES even believes that the rheumatic disease may exist without its external manifestation, and that the cardiac affection may precede the articular swellings, or may exist without any disease of the joints being manifest, especially in persons who have been formerly the subjects of acute rheumatism. Such cases as these are comparatively rare; but I have met with two cases, both in fishmongers, in which the symptoms were identical with acute rheumatism, with many of the symptoms of endocarditis, but without the external rheumatic affection. These cases were viewed and treated as internal rheumatism of the heart, and terminated favourably.

50. B. The *head* is variously affected in rheumatic cases. It may, as stated above (§ 40.), be the primary seat of sub-acute or chronic rheumatism in either of the parts there designated; or it may be implicated consecutively, or in the course of either of the forms of the disease. The usual states of rheumatism of the head have been considered in the article on HEADACHS (§§ 29, *et seq.* 50.). But the head may be differently affected from either of the modes there mentioned. — *First*, head affection, delirium, or mental disorder, in some form or other, may occur in the course of acute rheumatism, without any abatement, or with slight abatement, either of the fever or of the local disease. In these cases, the head affection is chiefly nervous, and contingent upon the febrile condition, in connection with depression of nervous or vital power. The affection of the nervous system may, however, be produced by too large or repeated bleedings,—by a rapidly induced anæmia,—or by colchicum, or by antimony, or by narcotics, and other depressing and perturbing agents. In all these cases the head affection is independent of any inflammatory action within the cranium.

51. *Secondly*, The symptoms referred to the head may appear at an advanced stage of acute or sub-acute rheumatism, most frequently of sub-acute and capsular rheumatism, attended by effusion into the cavity of the joint; and is generally followed by the subsidence of the disease of the joint. In this class of cases, always the most unfavourable, and generally occurring in persons of exhausted or depressed vital powers, or of a cachectic habit of body, the head symptoms are more or less indicative of inflammatory irritation of the brain or its membranes, often passing into effusion of serum into the ventricles or between the membranes. Although the affection of the head is attended by the partial or entire subsidence of the disease of the joint, yet it cannot be conceded that the subsidence has produced the disease within the cranium. It

should rather be considered that, during the course of the rheumatic disease, owing to the existing states of the nervous and vascular systems, influences acting on the brain or its membranes develop a morbid action in these parts which supersedes, or partially or entirely removes, that which previously existed in the joints; and that this form of head-affection is superinduced most frequently by causes acting on the mind, or on the brain and membranes, through the media of the senses, or still more directly and locally during states of vital depression, consequent either upon the duration or intensity of the disease, or upon an injudicious mode of treatment.

52. *C. Disease of the membranes of the spinal chord*, probably commencing in, or at least implicating the theca of the chord, is occasionally observed either complicated with, or immediately consecutive of, an attack of acute or sub-acute rheumatism. A case occurred to me in 1820, in which acute rheumatism of the joints, complicated with *pericarditis*, was followed by *chorea* and inflammation of the membranes of the spinal chord, soon passing into effusion of lymph, and terminating in complete general *palsy*. This case was not only demonstrative of this complication and succession of local affections, and of the appearances after death (see *London Med. Repos.* vol. xv.), but it also evinced the connection subsisting between rheumatism and inflammation of internal fibro-serous surfaces on the one hand, and between atonic spasmodic affections, *chorea*, and paralysis on the other.

53. When treating of the forms of paralysis and general paralysis (see art. PARALYSIS, § 70. *et seq.*), I described certain states of that disease which depended upon inflammation of, followed by the effusion of lymph upon or between, the membranes of the spine; and which often commence in a very slight form or degree of palsy, the movements of the limbs being at first uncertain, tremulous, irregular, or spasmodic, in many respects resembling *chorea*, and gradually becoming still more imperfect, until they are altogether lost, sensation still remaining unimpaired. This affection, in rare cases, is consequent upon acute or sub-acute rheumatism, appearing as a transference of the morbid action from the more external parts to the theca and membranes of the spinal chord. I have met with five cases of this description, two of them in children under twelve years of age; and in three of the cases I had an opportunity of examining the spine after death. In all three, coagulable lymph was effused within the theca, and pressed upon the chord and origins of the nerves; and the venous sinuses of the vertebræ were remarkably congested. It ought not, however, to be overlooked, that inflammation of the membranes of the chord, occasioning effusion of lymph and palsy, is generally attended by severe pain in the limbs, and a girding sensation around the abdomen, which may be mistaken for rheumatism, but which is owing to the irritation at the origins of the nerves supplying the pained muscles, and may be quite independent of pre-existent rheumatism, or of the rheumatic diathesis. (See art. SPINE, ITS CHORD AND MEMBRANES.)

54. *D. The pleura* may be affected either in the course or consecutively of an attack of acute

or sub-acute rheumatism; but not so frequently as may be expected. In one case, the pleura was implicated very soon after the complication of the rheumatism with *pericarditis* was ascertained, pleuritis with effusion rapidly supervening. The earliest writer who noticed the internal or visceral complications of rheumatism was probably BOERHAAVE (*Aphorisms*, § 1491.). He mentions the viscera in general terms; but particularises only the brain and lungs. VAN SWIETEN, in his excellent and practical commentaries, is more explicit; although even he fails in duly recognising the frequent complication of cardiac disease with rheumatism, if, indeed, this complication was as frequent in those days as in the present, which admits of some doubt*, although certain symptoms of this complication are not entirely overlooked by him; yet, in noticing these, we are surprised that more particular attention had not been directed to the state of the heart and pericardium. It is not improbable, although such cases are not frequently detected, or are often overlooked or mistaken, that rheumatism, affecting the intercostal muscles, or the fibrous tissues in the vicinity, may extend to the pleura, and be there followed by inflammation or effusion, in more numerous instances than generally supposed.

55. *E. The diaphragm and the peritoneum* are, as far as my experience permits the remark, more frequently affected in connection with, or consequent upon, rheumatism than the pleura. When rheumatic diaphragmitis is observed, either the pleural or the peritoneal surface presents the most evident indications of change, although the

* "Verum quandoque contingit, ut materies rheumatica admodum vaga sit, et, mox externas, mox internas, partes occupet; unde tales ægri in majori versantur periculo. Aliquando enim dolor in membris disparet, oritur pectoris anxietas, cordis palpitatio, pulsus intermittens, et, redeunte ad membra dolore, hæc symptomata disparent, pulsusque, paulo ante tremulus et intermittens, denuo æqualis et liberrimus est. Alibi describuntur plures similes morbi, qui mense Novembri 1759, in *Nosocomio Pasmanniano* aderant, quorum initium fuit horror per totum corpus, dein languor; postea dolor rheumaticus, partim vagus, partim fixus, qui omnia membra obsedit, et subinde post unam alteramve, horam cessavit, tuncque pectus oppressum fuit, et ægri inceperunt tussitare. Caput etiam doluit vario modo. Quandoque post plures horas dolor rheumaticus de novo per omnia membra diffusus est; et tunc illico desiit dolor capitis, pectoris oppressio, et tussis evanuerunt. Illæ autem mutationes in eodem ægro sæpius contigerunt.

"Hæc materies rheumatica, quandoque adeo mobilis et vaga, nisi bona curatione, dissipari possit de corpore, vel expelli, in unum locum confluit aliquando, et ingentes tumores lymphaticos producit; de quibus eadem hac paragrapho dictum fuit, quomodo in externa corporis superficie appareant, et illis pertusis, exiverit semper serum flavum viscidum, quod leni calore potuit inspissari. Cum ergo pateat, eandem hanc materiam ex artubus derivari posse ad caput, ad pectus, si nec inde salutari metastasi redeat ad artus, nec curatione expellatur de corpore, poterunt tales tumores in interioribus colligi, et pessima mala producere, imo mortem, uti cadaverum hoc morbo defunctorum sectio docuit.

"Tres ægri, in quibus serum, per universum corporis superficiem antea dispersum, subito interiora occupavit, rheumatismo perierunt. In binis cadaveribus reperiebatur copiosissima flava gelatinosa materia inter membranam pulmones ambientem et ipsos pulmones; totaque pulmonum substantia in admodum parvam molem compressa erat. Talis materies valde copiosa quoque interpiam matrem et cerebrum atque cerebellum hæsit; anteriores cerebri ventriculi simili gelatina pleni erant. In tertio ægro disparuit tumor artuum, secuta fuit difficilis respiratio, et tussis convulsiva, quæ nullis remediis obediit; unde miser intra quatuordecim dies, omnibus viribus exhaustus, periit. In medio pulmonis dextri detegebatur saccus, qui quinque libras seri flavi subacris reclusit. Cætera fuerant sana."—(VAN SWIETEN, *Commentaria in H. BOERHAAVE Aphorismos*, t. v. p. 654.)

crura, or the tendinous parts of the diaphragm, may be the chief seat of disease. When this viscus is implicated, the symptoms vary not materially from those mentioned in the article on its diseases, where, also, the connection sometimes existing between rheumatism and inflammation of the diaphragm is pointed out, conformably with the results of my observations, and with my subsequent experience. (See art. DIAPHRAGM, §§ 9. *et seq.*)

56. Although rheumatism may affect the *diaphragm* either alone, or in conjunction with one or other of its serous surfaces, or both, as a complication, extension, or metastasis of the disease, yet the *peritoneum* may be chiefly or even solely affected; the external disease either subsiding or entirely disappearing upon the development of the peritoneal affection. Rheumatic peritonitis is probably most apt to occur either during the puerperal states, or when rheumatism affects the aponeurotic expansions and fibrous structures of the abdominal muscles and parietes; but it is of comparatively rare occurrence. (See art. PERITONEUM, § 128.)

57. *F.* Rheumatism or rheumatic inflammation may attack the *ovaria*, or the *uterus*, generally upon the subsidence or disappearance of the disease from more external parts. Cases of this kind are rare. An instance of metastasis of rheumatism to the ovaria has been adduced by me at another place. (See OVARIA, § 7. *note.*) The *testes*, either one or both, may be also similarly affected; the pain being very severe, and the swelling considerable. Three instances of well-marked metastasis of rheumatism to the testes, of which I have preserved notes, have come under my care.

58. *G.* Of the more pure complications of *rheumatism*, there are none so frequent as those with *catarrhal fever*, or *simple catarrh*. I shall have to show hereafter that exposures to cold and humidity are more likely to produce attacks of rheumatism when malaria, even in slight grades, is superadded to these states of atmosphere, the catarrhal affection resulting equally with the rheumatism, which may assume either of its forms, but most commonly the sub-acute, slight, and chronic, from the combination of malaria with cold and humidity. Many writers, from BOERHAAVE to STOERCK, VAN SWIETEN, and others, have noticed the frequent association of rheumatism with *ague*, during some seasons, with *scurvy* in other seasons, and even with *dysentery*—complications manifestly depending upon the combination of atmospheric conditions, upon weather, season, &c.; and more especially upon exposure to cold, in conjunction with an impure or malarious atmosphere, or with exhalations of decayed vegetable and animal matter, and often with unwholesome or improper food.

59. *H.* Rheumatism is not infrequently complicated with *disorder of the catamenia*, or of the catamenial discharge. This subject has been recently noticed by Dr. TODD, who remarks that he “has been strongly impressed with the idea that the secretions of the uterus, if of an unhealthy character, and not duly thrown off, may be absorbed into the circulation, and contaminate the blood, producing symptoms of greater or less urgency;” and he adds, that he “cannot do more than propose as a query, whether, under certain circum-

stances, the uterus may not be regarded as a source of rheumatic or arthritic matter?” (*Op. cit.* p. 148.) I believe that in no circumstances is the uterus productive of such matter; but that it is, as I have contended in various parts of this work, a most influential agent in depurating the blood when it fully discharges its functions; and that it thus may prove, in the full exercise of these functions, the means of preventing attacks of both rheumatism and gout; whilst the imperfect discharge of the catamenial function, and of the depurating process thereby produced, may favour the development of either rheumatism or gout, the former especially before the forty-eighth or fiftieth year, especially in the rheumatic diathesis, or where the hereditary predisposition to either of these diseases exists. Hence interrupted, scanty, imperfect, or otherwise disordered states of the catamenia, may be an efficient or a concurrent cause of rheumatism; and thus catamenial disorder may be complicated with either of the forms of this disease. Hence, moreover, arises the frequency of chronic arthritic affections in females when the catamenia become difficult, scanty, and altogether cease.

60. IV. OF THE STATES OF THE BLOOD AND EXCRETIONS IN RHEUMATISM.—i. OF THE BLOOD.—It becomes a matter of some interest to consider the states of the blood in rheumatism, seeing that the disease is considered by several recent writers, as it was by BOERHAAVE, BAYNARD, VAN SWIETEN, and many others, during the commencement and middle of the last century, to depend upon a *materia morbi* existing in the blood. I shall, therefore, give the results of observations and examinations of the blood; and when I come to consider the nature of the disease, I shall then notice in how far the changes observed in the blood are the pathological conditions constituting the malady, or are merely the results of the influence of the disordered organic nervous system on the blood—whether the alteration of the blood is the proximate cause, or is the result, of the disease.

61. BAYNARD had long since asserted, that the saline and acid ingredients found in the blood and urine, are present in the former in excess, owing to the non-elimination of them by the kidneys and skin; and that the excessive accumulation of them in the blood caused the rheumatic disease. It is obvious to common observation, even if not shown by NASSE, SIMON, and ANDRAL, that the blood contains more fibrine in *acute* rheumatism, than in the normal state, and that the corpuscles decrease in proportion to the excess of fibrine. The fat is also increased. In proportion to the increase of the fibrine and fat, and the decrease of the corpuscles, the whole solid residue is diminished—this state constituting what SIMON has termed *hyperinosis*, for a principal part of the science of German pathologists consists in the coining of terms. In rheumatism, especially in the febrile states of the disease, the physical conditions of the blood, rather than its chemical constitution, or its microscopic appearances, are most important to the practitioner, who cannot carry a chemical laboratory, nor even a modern microscope in his pocket, and who cannot shape his treatment according to the reports furnished by those sources, however they may aid him in forming an hypothesis. In the acute states of the disease the clot is rather small, consistent, cupped, and covered by a strong buffy coat; the cupping

and thickness of the buffy coat depending much on the deepness and shape of the vessel in which the blood is received, and upon the rapidity and size of the stream. NASSE states that the coagulum is firm; but that when the buffy coat is very strong, the consistence of the lower part of the clot is much less. JENNINGS, according to ANCELL, maintains that the clot under the buffy coat is so loose as to fall to pieces on the slightest touch. Both are right in different cases and in different stages of the disease; at least such is the result of my observations. The serum is always clear, and of a deep yellow hue. With the frequency of blood-letting the size of the clot diminishes in proportion to the amount of serum, and the cupping and buff either continue, or even increase, however far depletion may be carried.*

62. According to SIMON, ANDRAL, and GAVARRET, the quality of fibrine and of fat is always much increased during the acute form of the disease, and that of hæmato-globulin much diminished; the proportion of blood-corpuscles diminishing, and that of serum increasing with the quantity or frequency of depletion. The *first* part of the following table exhibits the maxima, minima, and mean of forty-three analyses of the blood of fourteen persons in this disease; the *second* part, the analyses of the blood in four peculiar cases.

	Water.	Solid residue.	Fibrin.	Blood-corpuscles.	Residue of serum.
Maxima -	839.6	228.4	10.2	130.0	104.8
Minima -	771.6	160.4	2.8	70.1	76.9
Mean -	805.4	194.6	6.7	101.0	86.0
Healthy blood }	790.0	210.0	3.0	127.0	80.0
Case 1st.	826.8	173.2	4.8	79.0	89.4
Case 2d.	818.3	181.7	4.6	89.1	88.0
Case 3d.	815.4	184.6	4.0	82.6	98.0
Case 4th.	741.1	259.9	2.6	154.3	102.0

* Many years ago a remarkable illustration of this fact occurred in a case, which was attended by a surgeon in Walworth, to which Dr. W. and I were called at advanced stages of this disease. A man, aged about fifty, of a leucophlegmatic appearance and corpulent, had a severe attack of rheumatism of the lower extremities, for which he took, of his own accord, a large dose of croton oil. Violent hypocaustasis was the consequence, and the pain in the limbs suddenly ceased; but he was as suddenly seized with excruciating pain in the region of the heart, with extreme anxiety and palpitation. The surgeon instantly saw him, and bled him largely about the middle of the day. When he was seen again at night, he was found in no way relieved; the blood which was taken was very much cupped and buffed; and this appearance, in connection with the continuance of the distress, induced the surgeon to bleed him again the night of the same day—twice largely on the day of the occurrence of metastasis. The following morning he was no better. The second quantity of blood taken was more buffed than the first. Dr. W. was sent for, and he was bled a third time largely on the second day. The coagulum was now small, but still remarkably cupped and buffed. On the third day he was no better, and constant jactitation had supervened. He was bled the fourth time. I was requested to see him on the evening of that day: I saw the third and fourth quantities of blood taken away, the clots of which were very small, but remarkably cupped and buffed; the first and second quantities were described in consultation. The anxiety, action of the heart, and jactitation were extreme. The lips, gums, and surface were remarkably anæmied, and

63. The blood in the *first* of the cases (the second part of the table) was taken from a colour-mixer under the influence of lead, to which M. ANDRAL attributes the deficiency of the corpuscles. The blood was taken in the *second* from a person who had been bled six times, and had had 200 leeches applied. The *third* was the blood from a person with incipient chlorosis; and in the *fourth*, the blood was taken from a vigorous person twenty years of age.

64. The blood of ten persons suffering *chronic* and *sub-acute articular rheumatism*, furnished, according to the analysis of ANDRAL and GAVARRET, no striking results. The proportion of fibrine in no instance exceeded 5.0, and in two cases was as low as 2.9 and 2.6. The blood-corpuscles in one amounted as high as 154.3, and the solid constituents to 259.1. In the other cases, the corpuscles were below the healthy average. As rheumatism loses its acute, febrile, and severely painful character, so the fibrine diminishes and the blood approaches, or altogether returns to the healthy state. As these forms of rheumatism are more frequently aggravated than relieved by blood-letting, I have very rarely had an opportunity of observing the state of the blood in connection with them; but, in two cases, the chief change from the healthy state, observed in sub-acute rheumatism of the head, was an increase of the fat in both; the serum having been of a very white or milky hue in one case.

65. ii. THE URINE, in rheumatism, requires constant observation, as upon its varying states modifications of treatment are often indicated.—A. In *acute* rheumatism the colour of the urine is generally high, sometimes of a purple-red, or thin claret. Its acid re-action is very decidedly marked; and very bulky fawn-coloured, or lateritious sediments, consisting of urate of ammonia, and occasionally of crystallised uric acid, are deposited. Acetic and phosphoric acids have also been found in the urine in this form of the disease by HENRY and VAUQUELIN. In eighteen cases, in which the urine was examined by BECQUEREL, it always presented the characters usually observed in inflammation, as long as the fever continued. The deep colour and the acid re-action were always observed. The mean specific gravity was 1022.6. In cases which threw down a spontaneous sediment it was 1025.2 to 1027.0. He found, that after large bleedings the urine assumed the characters of that in cases of anæmia. Albumen was detected in seven of the eighteen cases. Oxalate of lime is of frequent occurrence. The other constituents vary somewhat; but, as the urine of persons in sound health varies in different indi-

he presented all the appearances I have described, as indicating extreme losses of blood. (See art. BLOOD, § 53. *et seq.*) Having heard the history of the case, and observed his existing state, I expressed my belief that he could not live twelve hours. He died within that period. The surgeon and I opened the body about twenty hours after death. Adipose matter was very abundant in the usual situations; and all the tissues presented the most remarkable pallor, very much resembling the appearance of veal. There was no fluid effused in any of the cavities, and the large vessels and cavities of the heart contained very little blood, which was coagulated into fibrinous, stringy clots, which contained a very small proportion of red globules. The internal cavities, and the valves, and columnæ carneæ appeared deeply red. The pericardium was natural, but pale, and contained no fluid. The appearances generally were similar to those of an animal bled to death. (See art. BLOOD, §§ 50—64.)

viduals, and in the same person at different times, no precise inference can be drawn respecting them.

66. *B.* In chronic rheumatism, and when the pains are not very acute, the urine often retains its normal characters. Of thirty seven cases, BECQUEREL found the urine unaffected in twenty: in seventeen it assumed the inflammatory character, and in nine of these it threw down a spontaneous sediment. If the complaint be very long continued, and much debility exist, the urine may, without being red or high-coloured, present a turbid, thick, or even foetid appearance. I have generally found the urine to have an acid re-action in the chronic as well as in the sub-acute states of the disease. In some cases, and especially when the membranes and sheath of the spinal chord are implicated, the urine has contained the phosphates; and it has never been alkaline, unless much debility or vital exhaustion exists.

67. *iii.* THE PERSPIRATION has not received due attention in the different forms of the disease, as respects either its chemical constitution, or its quantity and sensible characters. When the perspiration is profuse, in acute rheumatism, minute vesicles, or sudamina, are often observed on different parts of the surface, especially the breast or trunk. The perspiration has generally an acid or peculiar offensive odour, which is less remarkable, or becomes so, when any internal complication or metastasis supervenes. Lactic acid, the ordinary free acid in sweat, is usually increased; and SIMON states that, when there is an acid odour, acetic acid is present. Persons subject to chronic rheumatism have these pains removed by a free or copious perspiration; and those thus subject, who do not take sufficient exercise, are generally liable to have a return of the complaint, if a sufficiently perspirable state of the skin be not preserved, the cessation or sudden suppression of this discharge often sufficing to reproduce the disorder, without any exposure or other exciting cause.

68. *V.* DIAGNOSIS. — Rheumatism may be confounded with gout, with scurvy, and, in the form of lumbago, with nephritic affections, or with inflammation of the membranes or substance of the spinal chord. Various affections of the joints, of the periosteum, and of the nerves, especially neuralgic affections, may also be mistaken for rheumatism. — *A.* Rheumatism is often not easily distinguished from *Gout*.* In general, however,

the large joints are first attacked by rheumatism; and the small joints by gout, the former disease appearing, after chills or rigors, in the acute form, and at an earlier age than the latter; and, unless at a very early period of life, gout is more disposed to affect internal organs than rheumatism; and it is generally preceded by, and sometimes associated with, more marked disorder of the stomach, liver, and kidneys. It should not, however, be overlooked, that both diseases are so nearly allied, especially in certain of their forms, as not to admit of diagnosis, the arthritic form of rheumatism, especially when affecting the small joints, and occasioning nodosities (§ 25.), nearly resembling chronic gout, and justifying the popular appellation of "*rheumatic gout*."

69. *B.* From simple or scrofulous inflammations of the joints, rheumatism is often distinguished with difficulty. Rheumatic inflammation of the joints may, however, affect scrofulous persons; or inflammation of these parts may attack either the rheumatic or the scrofulous diathesis; and, although closely allied to rheumatism, as respects the former diathesis, it cannot be viewed as an instance of rheumatism of the part. In acute or sub-acute rheumatism not one joint only is commonly affected, but several, and the affection moves from one to another, and along the aponeurotic expansions; or if it be permanent in one, or intra-capsular, the distention gives the joint the appearance noticed above (§§ 28. *et seq.*). When inflammation and its consequences supervene upon the rheumatic affection, then the local disease presents the changes usually consecutive of simple inflammation of the joint, whilst the constitutional disturbance still preserves many of the rheumatic characters, and both one and the other often are influenced by atmospheric states and changes.

70. *C.* Rheumatism may approach the characters of *neuralgia*, or be associated with it. It may even affect, as stated above (§ 35.), the fibrous sheath of a nervous trunk, as in *sciatica*, or the *ischias nervosa* of COTUNNIUS. When rheumatism is complicated with that form of neuralgia which depends upon an affection of the sheath of the nerve, they may be both viewed as almost the same complaint, and differing only as implicating different seats or parts; and they generally both arise from the same cause. True neuralgia, or *tic-douloureux*, however, depends more upon some change affecting the origin or roots of the nerve, than upon any alteration implicating its trunk or branches, and occurs in very violent paroxysms, between which there is a complete immunity from pain; whereas, when the sheath of a nerve is attacked, there is more continued affection, more of the symptoms of neuritis, and often numbness of parts below

* "In rheumatismo discernendo a podagra chiragrave, sæpius falluntur medici. Sunt tamen, quæ distinguant. Medicus igitur primum omnium, utrum ægri corpus arthritidi proclivius sit, necne, animo diligenter perpendat. Deinde quæ indicia ante apparuerint, præsertim an ventriculus affectus sit, quod quidem in rheumatismo simplice perquam raro fit: perturbatio autem ventriculi sive *dyspepsia*, arthritidis accessionem biduum triduumve antevenerit. Qualis febris et rheumatismum et arthritidem comitatur, talis postea animadvertenda est. Ille enim a frigore et horrore incipit, nec remissionem habet; hujus verò febris statis temporibus remittit, et interdum omnia febris symptomata ex toto cessant. Tum ex ratione, quâ dolor accedit, et ubi resideat facile dignoscitur: Rheumatismus plerumque tardè advenit, et statim ab initio articulos majores occupat: si quando minores occupet, nunquam nisi in longinquioribus morbi exemplis fieri videmus. Contrà ea tamen Arthritis multò frequentius minores, quam majores torquet; quæ quidem articuli eò magis rubescunt et tumescunt. Podagra denique ætate provectiores, juniores verò rheumatismum, victimas excruciat.

"A doloribus scorbuticorum facile discriminatur. Scorbuticorum arteriæ non nisi permodicè inequali-

terque micant; interdum et subsiliunt. Scorbutus etiam specie interdum lividâ, quam urina præ se fert; specie et putrescendî, quæ per totum corpus hic illic conspicitur, sese haud rarò prodit.

"A nephritide satis distinguunt 'dolor in regione renis, sæpe ureteris iter sequens, vomitus, cruris stupor, testiculî ejusdem lateris retractio aut dolor,' et dolor renum ex statu pronâ nunquam adaugendus.

"Non est, cur hac in re, dolores, qui debilitatem e lue venerea enatam consequantur, nos in rheumatismo distinguendo fallant. Prior *syphilis*, et rerum inde ortam cognitio, satis discriminat." — (J. Copland, *Op. cit.* p. 20.)

the seat of pain, with a sense of burning heat in the part affected.

71. *D.* Although the pains experienced by persons suffering from secondary symptoms of *syphilis* have been ascribed by some to that malady, and by others to the mercury used for its cure, yet there is reason to believe that these, or either of them, may be only a chief cause, cold and other causes concurring with them to produce the distressing pains experienced during the night, generally in the periosteum of the more exposed bones. These pains, instead of affecting the joints, or extremities of the bones, as in rheumatism, are seated chiefly in the superficies of the bodies, or shafts, of the bones, and depend on a specific form of inflammation of the periosteum with thickening and nodes. The history of the case, the previous treatment, the seat of pain, the elevation, and irregularity of the part affected, the absence of fever, and the great severity of the pain during the night, generally indicate the nature of the complaint; especially when the flat surface of the tibia, or the outside of the ulna, or of the radius, or the sternum, or the frontal or parietal bones are affected; or when eruptions, sore throat, &c. accompany the disease; or when large quantities of mercury have been prescribed.

72. *VI. PROGNOSIS.*—SYDENHAM places the prognosis of rheumatism in a too favourable point of view, when he says that it is rarely fatal; and VAN SWIETEN very justly remarks, that this is only the case when it is fixed in the joints; for, when acute rheumatism changes its place, it is apt to seize upon some internal viscus, and place the patient in the most imminent danger. The justness of this remark will be readily acknowledged at the present day, when the frequency of complicated and metastatic rheumatism is considered, and the influence of age, and of various states of predisposition, in favouring the complications and metastasis of the disease, is recollected. The risk of cardiac complication is especially great,—indeed, the existence of it may be inferred in the great majority of cases, under the age of puberty; and both this and other complications and metastases, already noticed (§§ 47. *et seq.*), may occur at all ages. VAN SWIETEN observes, that when an internal affection commences after the subsidence of external rheumatism, and terminates fatally at a more or less remote period, the result is too often considered as due to the internal disease, and not to the rheumatism, which is actually the cause. Whilst, therefore, acute rheumatism is attended by fever; if it occur very early in life; if the pulse be very rapid, open, and compressible; if the patient have experienced a depletory or lowering treatment, and is the subject of mental anxiety; or if the pain continue to change its place, there still exists more or less contingent risk, even although the sounds and impulse of the heart be found natural upon a careful examination, and the functions of the brain be undisturbed. If internal complication is detected, or metastasis occurs, then the patient should be considered in a state of great danger; although recovery may take place in such circumstances, or the changes which have already supervened may only remotely tend to shorten life.

73. Even the *sub-acute* and *chronic forms* of the disease may be followed by prolonged suffering, or, if seated in the joints, may be followed by

irremediable, or partially remediable changes, as ankylosis, if neglected or improperly treated; and still more frequently by relapses, or by more or less suffering for months, or even years. In all cases of acute, sub-acute, or chronic rheumatism, an immunity from the disease, or from a relapse or return of it, should not be relied upon, until the tongue becomes clean, the biliary and intestinal secretions are natural, the alvine and urinary excretions are healthy, and until the perspiration is free and equable.

74. *VII. REMOTE CAUSES.*—*i. Predisposing Causes.*—*A. Temperament and diathesis* have some share in producing a state of predisposition to one or other of the forms of rheumatism. The disease may affect any constitution or temperament; but the bilious, melancholic, and bilio-irritable temperaments are apparently most liable to it. That there is a rheumatic diathesis—a *diathesis rheumatica*—has been asserted by most medical writers; this diathesis being hereditary. I have certainly observed numerous instances which seemed to support this opinion; but I shall give it a more particular attention in the sequel.

75. *B.* The most remarkable source of predisposition exists in the several *digestive, depurating, or eliminating organs*, especially the *stomach* and the *skin, kidneys* and *liver*, and even also the *intestinal canal*. In very few cases are the functions of the *stomach, duodenum, and liver* duly discharged, either for some time previously to, or during the attack. The stomach is weak, or the food unwholesome and insufficient; and the liver is torpid in function, or retentions of the secretion in the ducts and gall-bladder have taken place, until primary and secondary assimilation has been impeded or disordered, and excrementitious materials have accumulated in the blood. Whilst this state of the hepatic functions, especially when accompanied with biliary congestion or accumulation, occasions merely wandering or fixed symptomatic pains in some persons, it is often followed by attacks of either gout or of rheumatism, both in them and in others, when the predisposition to either is more fully developed, and the respective exciting causes come into operation. The functions of the other depurating organs, especially of the *kidneys, skin, and digestive mucous surface*, and even of the *uterus*, when imperfectly discharged, are also more or less concerned in predisposing to some form or other of this complaint; and even also in determining the particular states or complications in which it is often observed.

76. *C. Sex* has manifestly but little influence in predisposing to rheumatism; for so much depends upon exposure to the exciting causes, that those classes, whether males or females, which are thus most exposed, will present numerically the greatest predisposition. HOFMANN is certainly not correct in considering females more predisposed than males. Rheumatism is, perhaps, more frequent in the former, in a chronic form, after the age of fifty; but, before that age, it is certainly more frequent in males. VAN SWIETEN justly remarks, that men being more exposed, by occupation, by irregularities, and by dissipation, and their neurotic concomitants, are more liable than females to rheumatic affections. HAYGARTH states that he found the disease more frequent in males than in

females, in the proportion of 98 of the former to 73 of the latter.

77. *D. Age* has also no very marked influence after 15, or after puberty, if the proportion of persons living at certain ages be taken into the account. The greatest number of cases is met with between the ages of 15 and 30; but the proportion of those living at that age is greater than at a more advanced age. M. CHOMEL found that in seventy-three cases, thirty-five were first attacked between the ages of 15 and 30; twenty between 30 and 45; seven between 45 and 60; and 7 after 60. Two only were attacked before 15, one at 8, the other at 9 years. I have seen several cases between the ages of 5 and 15; but hardly one at that early age that was not complicated with either endocarditis or pericarditis, or with both, and even also with inflammation of the membranes of the spinal cord.

78. *E. Depressed, impaired, or exhausted organic nervous energy*, is most influential in predisposing the frame to the invasion of every form of rheumatism; and by whatever causes this energy may be weakened or exhausted, by none is this effect more manifestly induced than by premature or excessive venereal indulgences, and masturbation or self-pollution. By these, more perhaps than by other causes, is organic nervous power depressed, and the tone or healthy condition of the fibrous tissues subverted, thereby occasioning imperfect assimilation and excretion, and favouring the morbid influence and operation of causes which alter organic sensibility, and vital tone and contractility.*

79. ii. *EXCITING CAUSES.*—*A.* Of these, *cold* has been viewed as the most influential, in whatever way it may be directed on the frame. In many cases, however, it is not the mere abstraction of the animal caloric from the whole or part of the frame, but the combinations of this with other influences or agents.—(*a.*) Of these combinations the most common depend upon the modes of *warming and ventilating houses and chambers* in this country. Although these modes, viz., by open fire-places and coal fires, admit of a free and healthy ventilation, provided that the air thus supplied be pure, still the body is unequally heated by them; and whilst the parts opposite the fire are inordinately excited by the radiated heat, the other parts are exposed to, and depressed by, the currents of cold air proceeding from the doors and windows to the fire-place.† To this cause, more especially, may

be imputed the prevalence of the several forms of rheumatism in this country. Still more injurious are insufficient clothing, especially if it be connected with unwholesome or insufficient aliment; exposure to cold conjoined with humidity, and to currents of cold and moist air; riding in open carriages, especially at night, and without sufficient protection, and more particularly if the cold and humid air contain malaria, or exhalations from decayed vegetable matter; and living in tents, or lying and, still worse, sleeping on the ground, or on cold, damp, or wet places. This last cause is more especially injurious, inasmuch as it abstracts the animal heat, changes the natural electrical states of the body, and exposes the frame more completely to terrestrial exhalations at a time when it is most predisposed to be affected by them. In addition to these, wet-clothes, the sudden suppression of perspiration, the living in cellars or on the ground floor, or where the exhalations from the soil, or sources of vital depression are given out constantly, and even solicited by fires and ventilation.

80. The *causes* now enumerated, both predisposing and exciting, are such as depress the organic nervous energy, and weaken the functions of these organs which are actuated by the organic nervous system,—the digestive, the assimilative, the secreting and the excreting functions; thereby changing the condition of the blood, as well as more directly affecting the circulating fluids, through the heart and vessels themselves, and giving rise to morbid states of the secretions and excretions, more especially of the cutaneous and urinary excretions.

81. VIII. THE NATURE OF RHEUMATISM has been much discussed during the last and present centuries. It was formerly imputed, by BAYNARD, BOERHAAVE, VAN SWIETEN and others, to a *materies morbi* existing in the circulation, which affected particular parts in a prominent and painful manner, according to their predisposition or morbid tendency. More recently it was viewed by STOLL and LATHAM as an inflammation of a peculiar form, or affecting a particular series of vessels, namely, those only admitting the colourless parts of the blood, although the existence of such vessels had not been demonstrated. CULLEN, C. SMITH, and BICHAT, considered acute rheumatism as an inflammatory state of the muscular fibres, which assumed a peculiar form, owing to the cause and the nature of the structure affected. BICHAT, however, considered that this affection implicated more particularly the fibrous tissues of the joints and the aponeurotic expansions. These latter opinions were generally received when I ventured to suggest the view taken in the subjoined passage.‡ Since then

* “Inter hodiernos et nostrates potissimum ad luxuriam et incontinentiam nimiam referendus est; et ad artes operæ sedentariæ egentes, quæ corpus intra parietes retentum et occupatum infirmant. Eos certè, qui sedentarii victum quæritant, quique sub dio ferè nunquam morantur nec ibi ad sudores mediocres exercentur, citò infirmari; nimium admodum sentire, quique irritentur justò procliviores esse; idcirco e causis extra afficientibus faciliùs in valetudinem incidere, ex omnium experientiâ satis constat. Nec igitur latet, quamobrem nautas rheumatismo vacare, etiamsi præter ceteros homines, crebriores cœli mutationes, et causas omnes excitantes, subeunt. Ex hoc quoque liquet fœminas quàm mares, imbecillos quàm robustos, et antea affectos quàm immunes, sibi sæpiùs mancipare.”

† “Inter causas ejuscemodî, quæ patria in nostra rheumatismum longum excitare soleant, enumerari debet ratio domiciliorum calefaciendorum, quâ conclavia et cubilia nostra calore radiante temperantur. Nam adeo inæqualiter facit ignis, ut una ex parte corpus calefiat, ex altera frigeat. Huc forsitan adnumerandæ sunt crebræ vestium mutationes, vel potiùs ratio vestes induendi requeuter mutata. Rheumatismum longum et excitant

cœli intemperies, tempestatumque anni assidua mutabilitas. Ubi vel hiems vel æstas incipiat, et ubi desinenda sit, certissimè distinguere prorsus nequimus. Hiemen in mediâ æstate et æstum interdum haud mediocrem frigoribus in mediis non rarò vidimus: quin immo intra diem unicum temperatura aëris xxx gradus sæpe percurrit. Cœlum nostrum humidum est, quippe qui insulam incolamus, cui Zephyrus et Caurus, e regione calidâ exorti, perque oceanum magnum perequitanter, madidis incubat alis; et sudorem, qui corpus leniter perfundat, subitò reprimat: ideoque morbum sopitum resuscitat, aut in iis, qui antea vacabant, progignit.”

‡ “Quidam e scriptoribus antiquioribus de rheumatismo disserentes, quales hypotheses explicaturi sumus, tales fingeant: fluidorum scilicet lentorem esse, qui

Sir C. SCUDAMORE, HILDENBRAND, and TODD, have advanced different views as to the pathology of this disease. The first of these writers has regarded rheumatism as pain of a peculiar character, with or without inflammatory action, affecting several tissues at the same time, but chiefly the white fibrous tissues of the joints and muscles. "In acute rheumatism, he conceives the morbid action to be seated in the ligaments, the tendons, the aponeurotic membranes, and the bursæ, but in the ligaments most frequently. In the sub-acute form, though any of these textures, and even the nerves, may be affected, the disease is most frequently confined to the bursal, that is the synovial texture surrounding the tendons. In the chronic form, though the disease may occur in the ligaments and tendinous tissues, he represents it as most common in the sheaths of the tendons and the aponeurotic membranes."

82. HILDENBRAND is more elaborate in his consideration of this subject than any recent writers. He views it as a specific form of inflammation, affecting fibrous, or serous, or fibro-serous membranes, and differing from other specific inflammations proceeding from atmospheric conditions and changes—from catarrhal inflammations which affect mucous surfaces, from erysipelatous inflammations which attack the skin, and from phlegmonous inflammations which appear in any structure. Pain he considers, to be the chief characteristic, or eminent *παθος* of the complaint, the other characters of inflammation either being absent or contingently present. He considers that the imponderable agents, light, heat, and electricity, are chiefly concerned in the causation of the disease; states of the air, alterations of the temperature and conditions of the surface of the body, &c. subverting the equilibrium of the circulation, and occasioning efforts to recover the harmony subsisting between the different systems. These efforts he believes to be concerned in, or to constitute, the more immediate cause of rheumatism. I cannot refer to the numerous arguments by which he supports his views, but many of them are fallacious,

partis affectæ vascula obstruat; quidam verò, materiam morbidam in corpore generatam, et ibi per totum corpus circulentem, donec maturuerit, ut medicatricibus naturæ viribus, per vascula emunctoria expellatur; et hujusce materiæ morbidæ expulsionem perquam necessariam ad ægræ vel sanationem proferendam conducere. Huncce morbum in vasculis articuli dolentis *lymphaticis* sedem habuisse, apud quosdam hodiernos hypothesis tenet. Frigus tamen cui corpus, corporisve pars obicitur, vasculorum subter cutem dispositorum contentionem, h. e. spasmus efficere, indeque partium interiorem et articulorum et fibrarum musculorum et aponeuroseon tendinosarum inflammationem necessariò oriri, opinio jam propè universa est. Hæ hypotheses jam memoratæ, eorum quæ in rheumatismo occurrant partem tantum explicant, itaque simul ac editæ sunt, obsolescunt.

"Ab iis tamen, qui nihil nisi musculorum fibrarum et aponeuroseon tendinosarum statum inflammatum esse rheumatismum affirmant, queri possit: Quarè inflammationem gangræna aut suppuratio consequi nunquam reperiatur? quæ res quidem in reliqui corporis affectionibus, quæ ex inflammatione oriuntur, sæpissimè accidit. Et queri potest: Cur dolor hujusce morbi a cæterarum inflammationum cruciatibus tantum differat?"

"Nihil quidem, nostro judicio, obstat quò minus rheumatismum affectionem nervorum, præcipuè ad partem affectam pertinentem, singularem, hisque inseparabilem; et ex nihilo alio nisi adauctiore corporis, ut excitetur proclivitate (vel ut vulgò dicimus ex irritabilitate, vel sensilitate adauctâ), nasci existimemus. Quarè inflammationem, non rheumatismi causam; sed hujusce affectionis singularis nervorum, sive systematis vel ad partem affectam pertinentium, effectum esse arbitremur." (*Op. sup. cit. p. 17.*)

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and are founded on postulata. (See *Institut. Medico-Practicæ*, t. iii. p. 360. *et seq.*)

83. Dr. TODD, one of the most recent writers, has adopted a similar theory to that contended for by early writers in the last century. He observes that, on reviewing the leading phenomena of the rheumatic paroxysm, it is impossible not to perceive a resemblance of the most marked kind to some of those diseases which are confessedly due to the introduction of a morbid material into the blood; and that, as in those diseases, the fever is not relieved "until the morbid element which gives rise to it has, as it were, spent its fury on the textures to which it is attracted." He next inquires into the nature of the morbid matter, which he considers "to be the cause of the rheumatic diathesis, as well as of rheumatic fever;" and he proceeds to observe that "the two most remarkable excretions in the rheumatic diathesis, or fever, are the urine and the sweat. Both these are distinguished by the presence of an unusual quantity of free acid. The urine contains a large proportion of lithic acid; and those highly coloured deposits take place in it, which Dr. PROUT supposes to arise from the formation of purpurates. The lithic acid diathesis, however, is by no means so strongly marked in the rheumatic as in the gouty state; and these excessive deposits of lithates are more to be regarded, as belonging to the paroxysms, than as constant concomitants of the diathesis. The high colour of these deposits is more marked in rheumatism than in gout. The sweat of rheumatism is much more copious than that of gout; and is evidently much more acid. In the latter disease, indeed, sweating is generally absent. Lithate of soda is never found in the rheumatic paroxysm, nor in the diathesis,—and those derangements in the biliary system, which so often occur in gout, are not so apparent in rheumatism. If, with these considerations, we take into account the most frequent causes of the rheumatic diathesis and paroxysm, we shall obtain a further clue to the determination of the problem we have proposed. These causes must be admitted to be imperfect assimilation and vicissitudes of temperature,—and hence the ill-clad and badly-fed children of the poor are the most numerous victims of rheumatism. Hard work, exposure to cold and wet, bad food, are strongly contrasted as causes of the rheumatic diathesis, with the ease, comfort, and excess which give rise to the analogous one of gout. If now we remember that the skin is the great emunctory of lactic acid, and that bad food, or too little food, may give rise to its undue development, as well as too much food, it is no wonder that, as lactic acid is imperfectly excreted, through its natural channel, in consequence of the influence of cold in checking perspirations, and is too freely developed in the alimentary canal, it should accumulate in the blood and become eliminated at every point. Moreover, the long continuance of the causes which produce the defective cutaneous secretion, and the deranged gastric one, will give rise to the undue development of the lactic acid, in the secondary destructive assimilating processes; thus infecting the blood from every source, and tending to perpetuate the diathesis." (p. 142—4.)

84. There is much that is manifestly true in the above view taken of this disease; but the changes described are merely a part of the suc-

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cessive morbid conditions consequent upon the remote causes. They are, however, important changes, and have been always insisted upon by me in my lectures, and have furnished the basis for one of my chief indications of cure for many years, as shown in a work, published some time ago, in which the author states this doctrine and the treatment founded on it. He there remarks that, "in this species of fever the perspiration, urine, and saliva, will be found invariably acid, and the use of alkalies beneficial;" and he adds, that "this employment of alkalies, and the observation upon which it is founded, I derived a long time since from Dr. J. COPLAND."—(*The Simple Treatment of Disease*, by J. M. GULLY, 8vo. Lond. 1842. p. 133.) But, as I shall have to state hereafter, these are not the only changes which either constitute or prove a *materies morbi* existing in the blood, and directly causing or perpetuating rheumatism; there are other alterations which are both antecedent to, and concomitants of, these changes, and some of which are the causes of those which are more prominently manifested in the blood and in the excretions. There is every reason to infer, from the nature of the predisposing and exciting causes, and from the more immediately resulting phenomena, that the earliest changes which take place in the œconomy are depression of the organic nervous or vital energy, imperfect assimilation and impaired excretion; and that the resulting retention of effete and excrementitious materials (see Art. DISEASE, §§ 99—102. *et pluries*) is followed by morbid excretions, chiefly from the kidneys and skin. But, perhaps, the most important of the consecutive changes—consecutive especially of the morbid condition of the organic nervous system—is the increase of the fibrine of the blood and diminution of the red-globules; states which, under the influence of this system, are manifestly concerned in producing the complications and metastases which so frequently occur in acute rheumatism, and especially in those cases in which these changes in the blood are the most remarkable. After the most attentive consideration I have been able to devote to the subject, I believe that the *pathology of rheumatism* may be stated as follows:—

85. *a.* The remote causes or occasions of rheumatism are principally of that kind which either directly or indirectly depress the organic nervous, or vital energy of a part or of the whole body, altering the sensibility and other vital conditions and functions thus partially or more generally; and these causes, whether intrinsic or extrinsic, as respects the œconomy, affect, through the medium of the organic nervous system, the vascular system, and the blood, and ultimately the secretions and excretions.

86. *b.* These causes, especially such as impair the power of the constitution to generate animal heat, or rapidly transfer this heat from the surface, and are connected with changes in the electrical conditions of the body in relation to those of the atmosphere,—more particularly insufficient nourishment and clothing; low, humid, and cold localities; living in cellars, or upon or near to the surface of cold, damp, or clayey soils; the proximity of marshes and other sources of malaria; seasons in which the quantity of rain has been excessive, and east or north-east winds prevalent, &c.—are such as produce the most remarkable

effects upon the organic, nervous, and vascular systems, thereby developing, according to peculiarity of constitution, and concurrence of causes, the several forms of rheumatism and their characteristic phenomena.

87. *c.* Owing to the greater prevalence of these causes in some districts, or countries, than in others, rheumatism is so prevalent in these as to be *endemic* as respects them; and owing to unusually wet seasons, and the prevalence of east or north-east winds, or to remarkable vicissitudes of weather and temperature, this disease has been not merely prevalent in a single district, but also so very generally diffused as to have been *epidemic*; endemic and epidemic prevalences of the complaint having been generally overlooked by writers, and hence not referred to their respective causes.

88. *d.* The nature and operation of the remote causes—the effects produced by them on the organic, nervous, and vascular systems, and consecutively upon the blood, the secretions, and excretions; and the nature of these effects, especially in acute and sub-acute forms of the disease, serve to explain the frequency of the complications and metastases of these forms; the constitution of the blood manifestly favouring the supervention of disease of internal serous or fibro-serous surfaces, and the effusion of fibrinous lymph on the affected surface.

89. *e.* There is no satisfactory proof of the lactic or acetic acids, found in the perspiration during acute rheumatism, or of the uric acid found in the urine, having existed in the blood previously to their excretion from it, and there forming a *materies morbi*. It is, on the contrary, more reasonable to infer, that the elements of these acids accumulate in the blood, owing to the operation of the predisposing and exciting causes upon the organic, nervous, and vascular systems, and upon the organs which these systems actuate; and that the accumulation or condition of these elements gives rise to these acids in the excretions as well as to the other changes in them and in the œconomy; and that these acids are probably the effect, rather than the cause, of the disease. The excess of fibrine, and diminution of red-globules, in the blood, are most probably owing to the same mode of operation of the remote causes. Even granting that these acids are in part formed in the digestive canal, and in the blood during the disease, it is not unlikely that they are also partly formed by the excreting organs, especially when their large amount in some cases are considered.

90. *f.* The great importance of the primary effects produced in the organic nervous and vascular systems, and of the consecutive changes in the blood and excretions, should direct a more intimate reference to these effects, when devising the indications and means of cure, than has hitherto been attempted. These effects, primary and consecutive, are such as require the organic nervous energy to be duly supported and developed, the exuberance of fibrine to be diminished, the tendency to the exudation of fibrinous lymph on serous surfaces to be counteracted, and the morbid conditions of the secretions and excretions to be removed by means appropriate to the respective conditions.

91. *g.* The frequency of complications and metastases of rheumatism is owing—1st. to pre-existing tendency, lesion, or disorder of some or-

gan or part; — 2d. to exposure to some energetic cause during the rheumatic disease, as violent mental emotions, causing affections of the heart or brain; — 3d. to depletory, depressing, or exhausting means of cure, thereby lowering the vital resistance, and favouring the extension or metastasis of disease from the periphery to the centre of the frame; — 4th. to the neglect of the morbid states of the blood, especially of the exuberance of fibrine; — 5th. to the neglect of the physical and chemical states of the secretions and excretions, and of the means which these states should suggest; — 6th. to measures which act locally, and which, by suppressing the local manifestation of a general or constitutional disease, tend to the production of it in other parts, or in internal organs.

92. *h.* Rheumatism is attended by phenomena, which, however nearly allied to gout in many cases, are different as respects — 1st. the seat and character of the pain; — 2d. the state of the blood, particularly in regard of the abundance of fibrine, and the diminution of red-globules, in the former disease; — 3d. the nature of the excreted acids and salts, and the state of the excretions from the skin and kidneys (§§ 65—67.); — 4th. the seat and nature of the consecutive local changes, which in arthritic rheumatism are chiefly within the capsules and at the ends of the bones, but which, in gout, are external to the capsules, and are often attended, in chronic cases, by the peculiar gouty concretions; — 5th. the remote causes, predisposing and exciting; those of rheumatism chiefly causing a deficiency of red-globules and poorness of blood, those of gout, an exuberance of globules, and richness of blood.

93. *i.* The pain in rheumatism, whether affecting the fibrous tissues of joints, or of tendons and aponeurotic expansions, does not proceed from inflammation of these parts, or of the muscular fibre; and the increased pain on motion, or the inability of motion, is not dependent on affection of the muscles themselves; but are chiefly owing to the change in the functions and sensibility of the ganglial or organic nerves supplying these structures. When inflammation supervenes, it is owing to the influence of these nerves upon the capillary circulation of these tissues, and to the irritation of the morbid fluid exuded from them, either internally or externally, to the capsules.

94. *k.* That the disease actually originates, and continues mainly seated, in this part of the nervous system, is shown — 1st. by the nature and operation of the remote causes; — 2d. by the transition of the morbid sensibility from one part of the periphery of this system to another, — from one side or joint to that on the other, — from a superior to an inferior extremity, &c., — and, in cases of exhaustion, from the periphery to more central parts, and not in the course of the cerebro-spinal nerves. The changes in the vascular system, in the blood, and in the secretions and excretions, are the consequences of the morbid condition and excited sensibility of the ganglial nervous system. Inflammatory irritation, or action, when it supervenes, either internally or externally, is owing to this cause, or to the irritating nature of the fluid effused from the affected tissues, or to a combination of these causes; and the augmented pain on motion of an affected joint or limb, is also owing to the exalted sensibility and tenderness of the affected

fibrous or fibro-serous tissues, manifested more especially when these tissues are stretched, or brought to a state of increased tension.

95. *l.* The treatment of the several forms of rheumatism, especially the acute and sub-acute, has been conducted by me since the subject first engaged my mind, in 1814, upon the pathological basis now stated; and always with a successful issue, and without internal complications and metastases, if they were not present previously to the employment of the means which this view suggested.

96. IX. TREATMENT.—The *indications* and *means of cure* advised for the several forms of rheumatism have been as different, or even opposite, as the views which have been entertained of the causes and nature of the malady; and, even at the present time, very opposite doctrines respecting the pathology and treatment of the disease are promulgated by able authorities, each one appealing to facts — too often false facts — as demonstrative of success, without giving due consideration to the influence of vital resistance or constitutional power — the *vis medicatrix naturæ* — in withstanding injurious influences and agents, and to the manifest disposition of the œconomy to return to a normal condition, where injurious causes no longer continue to operate, and where no organic injury calculated to impede or interrupt the vital functions has been produced.*

97. *i.* TREATMENT OF ACUTE AND SUB-ACUTE RHEUMATISM.—Having taken a view of the modes of treatment and means of cure which have been recommended for these forms of the disease, and having given my opinion respecting them, I shall next state the treatment which I have employed for these forms of rheumatism since the earliest period of my practice, and which I have found most beneficial in the simple forms of the disease, when no complication nor metastasis had supervened. It may, however, be remarked, that the treatment of the several forms of rheumatism must necessarily vary with the locality in which persons who are the subjects of them reside — according as the patient resides in the country, in a healthy and dry atmosphere, or in a humid and malarious air; or in a close, low, crowded, and large town, and as he has been well or ill fed and clothed. Neither should it be overlooked that a somewhat different treatment may have been required by our ancestors who drank malt-liquors, and not tea, and

* “Apud antiquiores de rheumatismi curatione nihil certi repertum: quippe qui morbum, sicut supra memoravimus, penè ignorare, et cum arthritide confundere, viderentur. Veruntamen, ut e scriptis Græcorum patet, sanguinem mittere, movere alvum, et tepidâ perfundere solebant. Romani de rheumatismo curando nihil meminerunt; neque dubium, quin podagræ chiragræve speciem duxerint.

“E GALENI temporibus usque ad seculum decimum sextum, de hoc morbo, deque curatione ejus, nihil prorsus repertum; nec apud Arabes quidem, ubi, Europâ ignorantæque barbariæque nebulis obumbratâ, omnes Æsculapii filii discipulique concesserant. Sub finem seculi decimi sexti, rheumatismum ab arthritide et catarrho, quibuscum tam sæpè confusus esset, discriminavit BAL-LONIUS, eique iterum rheumatismi nomen, forsân parùm feliciter, indidit. SYDENHAMIVS hunc morbum ex artis medicæ regulis submovere, et sub morbi accessionem ante omnia sanguinis missioni fisis videtur. Ferè nullus alius morbus est, cujus in curatione plura medicamentorum genera medici neoterici adhibuisse videntur. Nec mirum, quoniam unusquisque eorum, prout ipse de proximis morbi causis judicat, vel hæc remedia vel illa adhibet. Eventus felices quos a remediis quæ absolutoria existimaverint, affici sibi gratulentur, ἀποκατατα potius, sive viribus naturæ medicatricibus posse attribui, haud mediocris suspicio habenda est.” — (*Op. cit.* p. 22.)

spirituous liquors, as in modern times. These latter, taken even in moderation, especially when taken habitually, impair more or less the primary and secondary processes of assimilation, impart more of a nervous character to diseases, and contra-indicate the employment of vascular depletions, unless with caution and in moderation.

98. *A. Blood-letting* was recommended by SYDENHAM at an early period of his practice, and certainly to an extent which could not fail of being injurious in many instances. Of this he appeared to have become afterwards convinced; for in a letter to Dr. BRADY he admits that it impaired the strength, and favoured attacks of other diseases. He therefore trusted, at a later period of his practice, to a diet consisting chiefly of whey. SYDENHAM had probably been induced to adopt frequent bleedings for this disease at the commencement of his practice by the advice of DE BAILLOU or BALLONIUS, and RIVERIUS, who had advised this practice. BOERHAAVE also recommended large blood-letting early in the treatment; but his very able and learned commentator, VAN SWIETEN, and about the same time SROERCK, saw reason to be more cautious, and advised it only for the young and plethoric, and when the pulse is strong and full. TISSÖT, PRINGLE, D. MONRO, and STOLL, also recommended free or repeated blood-letting, aided by diluents; and the practice was followed by THILENIUS and BANG, and adopted by CULLEN, with more reservation, he bringing to its aid local bleedings, diaphoretics, and purgatives. HEBERDEN was still more cautious, and contended that venesection was not suited to the majority of cases, and ought to be prescribed only for robust persons. Dr. FORDYCE had at first recourse to blood-letting; but his experience led him to infer that it favoured the occurrence of internal metastasis, and he therefore abandoned the practice. Dr. FOWLER resorted to bleeding in 41 out of 87 cases, and found that only three were cured, seven much relieved, seven partially relieved, twenty very little relieved, and four not at all benefited. Dr. LATHAM regarded blood-letting as not required, although he did not object to local bleeding by leeches, as advised by Dr. FOWLER, and trusted chiefly in diaphoretics, diluents, laxatives, and rest. Ultimately, Dr. WELLS and WILLAN came nearly to the same conclusion, as respects the treatment of the disease in London and large towns, namely, that blood-letting is either unnecessary or injurious, by enfeebling the patient and favouring internal translations of the malady. More recently Mr. BEDINGFIELD and Dr. CRAIGIE have advocated early and large blood-letting. But the former wrote when venesection was a common remedy, and was certainly less prejudicial, as respected the prevailing epidemic constitutions (from 1810 to 1825), than it has been subsequently. Dr. CRAIGIE, practising in Edinburgh, has declared in favour of blood-letting, aided by diaphoretics and cathartics, and contended that, "in order to be beneficial, it ought to be performed early in the disease, and carried to a considerable extent." He considers that the best time is within the first three or four days, or, at all events, within the first week. It should be carried, he adds, "to twenty, twenty-five, or thirty ounces at once, and within twenty-four hours to as much more;" and he attributes the want of success of FOWLER and others to the

smallness of the quantity taken. M. BOUILLAUD has advocated a somewhat similar practice to the foregoing; but, instead of abstracting at once the quantity advised by Dr. CRAIGIE, he has adopted the abandoned method of SYDENHAM, and has advised a smaller quantity on more frequent occasions to be drawn.

99. I believe that the treatment of any form of rheumatism by blood-letting, as a general principle of practice, however early in the disease, to be productive of injury in some cases—of rheumatic inflammations of the internal and external membranes of the heart, of the peritoneum, pleura, synovial membranes, &c.; of delirium, prolonged convalescence, and of the degeneration of the more acute into the chronic states. I will not deny that the robust, or those in the prime of life, who live well and enjoy a wholesome air, will bear full or even copious depletion at an early period of the disease, generally without detriment, and possibly with advantage; but I am convinced, that in large cities or towns, in persons employed in warm, ill-ventilated factories, or those living in crowded rooms, low apartments, cellars, &c.; in the very young, and in the old especially; wherever there is any indication of deficiency or poorness of blood; and, *à fortiori*, in the ill-clothed and ill-fed, vascular depletion in any form is often most injurious, and always unnecessary—rarely required, even for the apparently robust; unless it be conjoined with the method of cure which I shall recommend in the sequel. (§§ 115, *et seq.*)

100. *B. Mercurials* alone, or with opium, have been advised for the acute and sub-acute forms of rheumatism, since the benefit produced by them in inflammations of serous membranes was shown by Dr. HAMILTON. The practice was adopted by NIEMANN, and by many modern writers, with the view of preventing the effusion or formation of coagulable lymph, especially in the internal extensions or metastases of the disease. But there is every reason to believe, that mercurials, prescribed so as to produce their specific constitutional effects, will exert but little influence either in removing rheumatism, or in preventing the affection of internal parts; although they, especially calomel, will be of service in removing biliary accumulations and congestions, in rousing the torpid functions of the liver, and when conjoined with opium, in promoting the excreting functions of the skin—an intention always necessary to be accomplished in rheumatism. But there is another preparation of mercury, which, when conjoined with other medicines, is often of service in certain forms of rheumatism, viz. the bichloride. This, when taken in minute doses with the compound decoction, or fluid extract, of sarsa, or with the decoction of cinchona or infusion of serpentaria, &c., is often of great service in some sub-acute and chronic states of rheumatism of the joints. Attempts to cure the more acute forms of rheumatism by salivation, as suggested by some writers, whilst by no means preventing, if not increasing, the risk of internal metastases, always render convalescence prolonged, and favour the degeneration of the acute and sub-acute into the chronic forms.

101. *C. Emetics*, followed by cholagogue purgatives, or *eccoprotics*, were much praised by LENTIN, THILENIUS, and STOLL, at a very early

period of the disease, and more especially in that state of acute rheumatism, which they denominated bilious, or in which biliary disorder was manifestly present. CLOSSIUS recommended the repeated exhibition of emetics. There can be no doubt of the propriety of the practice, in the circumstances just stated, and if the treatment be not otherwise depressing. Emetics have been rarely given in rheumatic fever in recent times; but I have prescribed them in a few cases at the commencement of the attack, conjoining them with warm cardiacs, or aromatics, or stimulants, so as to produce not only full vomiting, but also copious perspirations, as early in the disease as possible.

102. *Purgatives*, especially cholagogues, are generally required early in the disease, although they have been but little insisted on by writers, excepting BUCHHAVE and a few others. But they should be prescribed only so as to procure a free alvine evacuation, and discharge of bile, without occasioning severe catharsis; for a too violent action on the bowels, and more especially if it be conjoined with vomiting, will remarkably risk the suppression of the local affection, and cause some internal complication or metastasis of the disease, as in the very remarkable instance adduced above. In the more acute states of the disease, I have usually prescribed, as early as possible, a moderate or full dose of calomel, with ipecacuanha or James's powder at bed-time, and a purgative draught, as the compound infusions of gentian and senna with the sulphate and carbonate of magnesia, in the morning; the satisfactory operation of these being introductory to other more efficient means. In some instances, I have preferred half an ounce each of spirits of turpentine and castor oil, taken on the surface of milk, or of some aromatic water; and when the bowels do not act copiously, an enema, containing about an ounce of turpentine with ten grains of camphor, or half a drachm of assafoetida, and some common salt, will always be most serviceable. The evacuations ought to be carefully examined; and if, from their appearances, there is any reason to infer either the retention of disordered intestinal excretions, or retention or disorder of the biliary secretion, the purgatives now mentioned, or such other as the peculiarities of the case may suggest, avoiding violent measures, should be repeated occasionally, until the motions present a more healthy character. This end is not always attained by prescribing cold saline purgatives; but it will be more certainly and speedily reached by conjoining stomachics and bitters with the purgatives.

103. *D. Diaphoretics* have been recommended by many for all forms of rheumatism, but they are not equally beneficial in all, nor are all diaphoretics equally efficacious. The medicines of this class which are most serviceable are the preparations of *antimony*, either alone or with opium; *Dover's powder*, or *ipecacuanha* and *calomel* with opium; the *liquor ammoniac acetatis* with *sesquicarbonate of ammonia* in full doses, and with the *spiritus ætheris nitrici*; *guaiacum*, in the form of decoction or tincture, with *ammonia*; and *camphor* with *nitre* and *opium*, or *camphor* with *James's* or *Dover's powder*, or with *antimony*, or with preparations of *ammonia*. Although the most acute states of rheumatism are generally attended by abundant sweats, which produce no relief, yet these do not contra-indicate a recourse to dia-

phoretics. If this course of treatment be adopted, there are certain points which should receive due attention in connection with it.—1st. All retained, accumulated, or morbid biliary and intestinal excretions should be previously removed by the means already noticed; so that the patient may not be chilled, during the diaphoretic operation, by getting up to the night-stool.—2d. The patient should be enveloped in, or have next his skin, a long flannel night-gown; or, in default of this, a cotton one; and he should sleep in soft woollen or flannel blankets, or in cotton sheets.—3d. A sufficient supply of warm antacid and saline diluents, and especially an abundance of fresh whey, or of very weak, but fresh mutton or veal tea, or barley water, should be always ready, which may be made the vehicle for diaphoretic or other medicines, and which, taken abundantly, may promote diaphoresis.

104. *a. The antimonial diaphoretics* are the tartar emetic in small doses; James's powder or antimonial powder, either alone or with other substances, as with alkalies, opium, camphor, &c. The alkalies and magnesia, in the state of carbonate, aid the effect of these, and neutralise the acids present in the prima via. Opium increases or insures a sudorific effect, and is generally of more or less service when thus conjoined, if biliary and intestinal accumulations and retentions have been removed, and when the symptoms are very acute, and when vital power and vascular fulness have not been too much reduced. When, however, the patient has been too freely depleted; or when there is much exhaustion; and especially if the urine indicate much free acid; or if the perspirations have an acid smell, &c., then other diaphoretics are indicated, and antimonials should be relinquished.

105. *b. The preparations of ammonia*, with or without *guaiacum*, or the *spiritus ætheris nitrici*, or *camphor*, or other medicines, are then, I believe, the most beneficial. If the *liquor ammoniac acetatis* be prescribed, it should be conjoined with full doses of the sesquicarbonate of ammonia, and the spirits of nitric æther; or, if *guaiacum* be preferred, it may be given with ammonia or camphor. *Guaiacum*, either alone or with ammonia, was formerly much employed in rheumatism; and much praised by Dr. FOWLER; and more recently by Dr. SEYMOUR; the former preferring the simple tincture, the latter the mixture, of the pharmacopœia. I have prescribed either, but generally in conjunction with large doses of the carbonate of ammonia, or some other alkali, for reasons which will appear hereafter. The gentle operation which it often exerts on the bowels, when given in a sufficient dose, is also advantageous, but its free diaphoretic effect should always be aided by diluents, and by the regimen advised above (§§ 103.).

106. *c. Dover's powder* has been very generally employed in the several more acute states of rheumatism; but it should be prescribed either in its original form, the nitrate of potash being substituted for the sulphate, or the ipecacuanha should be given in larger doses in the form of pill. One grain of ipecacuanha, with one of opium and eight of nitre, should be given in the form of pill every two hours, until three or four doses are taken; and then this dose should not be given oftener than every tenth or twelfth hour, the ope-

ration upon the skin and urine being promoted by a copious use of diluents, containing nitre and the sub-carbonate of soda or potash, that may be rendered pleasant by the addition of the usual spices and aromatics. At the commencement of the attack, the ipecacuanha, in doses of two or three grains, may be given with an equal quantity, or somewhat more, of calomel, and a grain of opium; and be followed, after three or four doses, by a stomachic purgative, or by either of those already mentioned (§ 102.); and, after the bowels have been evacuated, the ipecacuanha, opium, and nitre, may be taken so as to procure a copious perspiration, which should be promoted by the regimen and medicated diluents already recommended. In some cases I have preferred a combination of ipecacuanha, camphor, and opium, the camphor in doses of three or five grains, with the same quantities of the ipecacuanha and opium as already advised; nitre and carbonate of soda or potash being taken freely, in large quantities of diluents or demulcents.

107. *d.* Calomel and opium have been recommended for their diaphoretic and alterative effect; but they should be given only at the commencement of the disease, and should then be combined, at first, with full doses of ipecacuanha, and afterwards with camphor; but after a few doses—not more than three or four—a purgative should be taken, and its operation promoted by an enema, (see § 102.)

108. *E.* The nitrate of potash was much employed for acute rheumatism by BROCKLESBY, RANOE, and THILENIUS, who gave from one ounce to an ounce and a half in the twenty-four hours, copiously diluted, and continued thus to exhibit it for five or six days, when the disease generally began to subside. I have prescribed it for many years, but not in so large doses, using it chiefly in the drink of the patient with the carbonate of potash or of soda, or prescribing it in the decoction of bark, either combined thus, or with the liquor ammoniæ acetatis, and spiritus ætheris nitrici. The intention of these writers was to excite the skin and kidneys to the due elimination of hurtful materials from the blood; my object being to rouse all the emunctories to increased action, to develop organic nervous energy, and to counteract the morbid disposition and condition of the blood.

109. *F.* The treatment of acute rheumatism has been confided chiefly to opium, by BRUGNATELLI, and more recently by Dr. CORRIGAN. It has been recommended also by other writers in large doses, but generally with antimony, ipecacuanha, calomel, &c. I have given as much as seven or eight grains in the twenty-four hours, in the form of the pilula saponis comp. of the pharmacopœia; but I have considered the free use of opium most advantageous in conjunction with ipecacuanha or with camphor. In the most acute states of the disease large doses of opium are easily tolerated, especially when conjoined with warm spices or aromatics, or with ipecacuanha and capsicum, and are often indispensable and most beneficial in conjunction with the alkaline and tonic treatment which I have long employed.

110. *G.* Peruvian or Cinchona bark was first recommended for acute rheumatism by MORTON. It was, however, objected to by CULLEN, whilst PRINGLE and HEBERDEN gave only a somewhat favourable, but an undecided, opinion respecting

it. HULSE, FOTHERGILL, and SAUNDERS wrote more decidedly in favour of it, and HAYGARTH entered upon an elaborate defence of the use of it for this disease; and his inferences received the support of FORDYCE and WILLAN, although Dr. PARRY offered certain objections to it, which can have no weight when duly examined by the physician who has had any experience of the operation of this medicine in acute rheumatism. I have always employed cinchona for this disease, in various states of combination, since 1819, and have, up to the present day, preferred the decoction of the cinchona cordifolia, in full doses, conjoining it with other remedies, which the stage and peculiarities of the case have suggested. But the bark should be prescribed as early in the attack as possible; and if the alvine evacuations have not been sufficient, or if biliary and intestinal colluvies still remain, it may be preceded by an emetic, and by a dose of calomel and James's powder at night, and a purgative draught in the morning; or these means may be occasionally resorted to without materially interfering with the due employment of the bark. At an early stage of the more acute cases, I have generally prescribed the decoction of cinchona with the liquor ammoniæ acetatis and nitre, often also with full doses of the spiritus ætheris nitrici, the patient having been allowed a large supply of diluents, consisting either of whey, or of water gruel or barley water containing nitre and the spirits of nitric æther. If the disease was not soon afterwards mitigated, the decoction was taken with the liquor ammoniæ acetatis, with sesqui-carbonate of ammonia, in full doses, and sometimes also, especially if the disease had been of some duration, with the tincture of serpentaria. In cases where the perspiration was copious, and the urine scanty, the decoction was prescribed with the carbonate of potash or soda, to which the ammonia and spirits of nitric æther were often added. The patient's drink generally contained an alkali instead of nitre; and the weak animal tea, mentioned above (§ 103.), was often given thus medicated, and rendered palatable by spice or aromatics; and whilst it quenched thirst, it furnished all the nourishment required. In some cases, the decoction of bark was given with a preparation of colchicum, but very rarely, unless ammonia, in full doses, was conjoined with it. (See §§ 105.)

111. Since the introduction of sulphate of quina into practice, the other preparations of cinchona have been much less employed. Yet in rheumatism, as well as in several other diseases, I have preferred the decoction, or the compound tincture, especially in the combinations just mentioned. In some instances, however, of the sub-acute and chronic disease, I have given the quina with much benefit, especially in conjunction with camphor, in the form of pill; and, where there has been much evidence of anæmia, the sulphate of iron has also been added. In some such cases, or when certain peculiarities of the case suggested a combination of tonics and purgatives, then the quina, either alone, or combined as now stated, has been given, in the form of pill, with the purified extract of aloes, or with the compound rhubarb pill, or the aloes and myrrh pill, two or three grains of either acting freely when thus combined.

112. *H. Colchicum* has been much employed in acute and sub-acute rheumatism since 1815 or 1820; but not always with sufficient caution. I have rarely given it, even in the most acute states of the disease, unless in conjunction with cinchona and an alkali; or in the evening and at night, these other medicines having been taken in the morning and during the day. One or two grains of the powder of the cormus, or of the extract, have been thus conjoined with an equal quantity of the powder of capsicum, and with three to six grains of the soap and opium pill; the smaller doses having been taken at six and ten P.M. or the large dose at nine P.M. only; the morning and middle of the day, when the remission of fever is generally observed, having been devoted to the administration of the preparations of cinchona and of the alkalies. The following has been found very serviceable.

No. 331. *R. Magnesiae Carbon. gr. xij; Ammoniae Carbon. gr. vj; Vini vel Tinct. Seminum Colchici ℥ xx ad 3ss.; Tinct. Cinchonae Comp. ʒjss. vel ʒij; Tinct. Capsici ℥ iij; Tinct. Opii. ℥ v; Aquae Cinnam. vel Carui, et Aq. distil.: aa ʒvj. Misce. Fiat Haustus bis terve in die sumendus.*

113. *I. Aconite*, in the form of expressed juice, extract, alcoholic extract, or tincture, has been recommended by many in rheumatism, since it was first employed by STÖERCK, especially by THILENIUS, RANOE, GESNER, and LENTIN. I have tried it in several cases, both simple and complicated, having always preferred the extract or tincture prepared with rectified spirit; and according to the formula recommended by Dr. PEREIRA. Of the former, from one sixth to a fourth or half a grain may be taken every sixth or seventh hour; or from three to five drops of the latter; but either preparation should be given with caution, and the effects duly watched. I have usually prescribed the tincture in distilled water only; and the extract in the form of pill intimately mixed with liquorice powder and simple syrup; and directed whichever was prescribed to be taken in the intervals between the administration of the other medicines employed. I have considered the aconite, when cautiously used, as a powerful agent in removing the morbid sensibility and excited vascular action in acute rheumatism; but I have employed it chiefly in aid of the other means already mentioned, especially the decoction of cinchona in the states of combination noticed above (§ 110.). In the cardiac or pericardiac complications of the disease it is a valuable auxiliary to other remedies, as will be mentioned hereafter.

114. *K.* A method of cure, which Dr. TODD has called "*the treatment by elimination*," has very recently been recommended by this physician. "It is probable," he observes, "that the *materies morbi* in rheumatic fever is lactic acid. We know that the natural emunctory of this is the skin. Many chemists maintain that it will also escape by the kidneys; and if it ever does so, perhaps this is more likely during rheumatic fever than at any other time." The indications he suggests, in conformity with this view, are "to promote the action of the skin, the kidneys, and the bowels; to use antacid remedies, and to give large quantities of fluid for the free dilution of the *materies morbi*, and in aid of the drainage by diaphoresis and diuresis." — (*Lond. Med. Gaz.*, vol. XLII. p. 573.). To obtain these ends, he recommends

Dover's powder, and the other means usually employed. But, I may remark, that this acid is not the only *materies morbi*; there is an increase of fibrine and colourless corpuscles in the blood, as shown above (§ 62.), and when treating of rheumatic inflammation of the surfaces of the HEART (§§ 20. 129—133.), with a disposition to their exudation on the serous surfaces, especially those of this organ, whilst the quantity of red globules is diminished. The predominance of acid has been long ago contended for; but whether the acid is formed in the stomach, as Dr. TODD supposes, or by the emunctories from the constituents of it existing in the blood or partly by both, has not been satisfactorily shown. However this may be, the treatment it suggests has been long employed in acute rheumatism, as already noticed (§ 84.). The means of cure, however, should not be limited to this single morbid material, but be extended so as to comprize other changes in the blood and nervous system; which, as Dr. TODD very judiciously argues, and as was shown above, and when describing the treatment of *rheumatic endocarditis and pericarditis* (see *Art. HEART*, (§ 144. *et seq.*), can never be removed by blood-letting alone. Indeed, in many cases of the disease, especially in those of some duration, and when there was a deficiency of red globules inferred, I have prescribed the preparations of iron, as the oxydes or carbonates, with the carbonate of some one of the alkalies.

115. ii. TREATMENT ADVISED BY THE AUTHOR. — This may be partly inferred from the remarks already made; but it depends much on the duration, seat, and form of the disease, and upon the means which have been already resorted to. The indications or intentions of cure should be directed to the removal of the morbid conditions which constitute the disease, as far as these are known, and as far as experience may have proved the efficiency of the means recommended for this purpose. We should more especially endeavour to develop organic nervous energy, so as to promote the assimilating, the depurating, and excreting functions, — to diminish morbid sensibility, — to counteract whatever disposition may exist to form acid in the *prima via*, — to remove from the blood, or to neutralize the materials from which acid is formed, as well as whatever acid may be present, — to increase the quantity of red globules in the blood, when these are deficient, — to correct the morbid condition of the liquor sanguinis, — and to prevent the exuberance of fibrine and the tendency of it to concrete, and to exude in the form of a fibrinous plasma or lymph, on serous surfaces. As a prelude, however, to the administration of such means as may seem most efficient in attaining these ends, disordered or accumulated secretions and excretions should be evacuated by appropriate agents, — by medicines which moderately evacuate without occasioning vital depression or exhaustion.

116. *A.* If the patient be seen by the physician early in the attack, and if the symptoms are *acute*, he should be placed in a long flannel night gown, or between flannel or soft woollen blankets; the other parts of the regimen specified above (§ 103.) being also observed. If there be no cardiac complication, if bilious colluvies be inferred to exist, if the tongue be loaded or covered by a yellowish fur, and if the alvine excretions

have not been hitherto natural or free, an *emetic*, consisting either of *ipecacuanha* or sulphate of zinc, with two or three grains of capsicum, should be given, and its operation promoted by drinking a warm infusion of chamomile flowers. Soon after the emetic action has ceased, especially towards evening or night, four or five grains of *calomel*, and one and a half or two of *ipecacuanha*, and an equal quantity of *opium* and *capsicum* should be taken, and be repeated in five or six hours, if a free perspiration, or some action on the bowels has not resulted from the first dose. If the bowels continue insufficiently open, four or five hours after the second dose, or the stools offensive or morbid, a *purgative draught* may be given; or an *enema*, containing an ounce of *turpentine* and two of *sweet oil*, with a scruple of *assafœtida*, ten grains of *camphor* and a little salt, may be administered. Fæcal and bilious accumulations having been evacuated by these means, the decoction of *cinchona* ought then to be given in such combinations as the existing state of the patient will suggest,—with liquor ammoniæ acetatis, spiritus ætheris nitrici, and nitras potassæ, if the febrile action is great and the urine scanty and high-coloured, and at an early stage;—with the carbonate of the alkalies, or with ammonia or magnesia and colchicum;—or with either of the alkalies and serpentaria, if the disease is further advanced. During the liberal use of *cinchona*, of alkalies, &c., the states of the bowels and of the urine and perspiration should be carefully watched. If the bowels are not sufficiently open, a dose of *calomel*, *ipecacuanha* and *opium* may be given at night, and a draught, with half an ounce each of *turpentine* and *castor oil*, in the morning. If the biliary and intestinal excretions are sufficiently free, two grains each of *opium* and of *ipecacuanha*, with five of *nitre*, or three of *camphor*, may be taken in the evening. If the excretions manifest much acidity, the alkalies should be given liberally, both in the patient's medicine and in his drinks; and if the pain continue severe, notwithstanding the liberal employment of them, either an increased dose of *opium* should be given at night, or ammonia and colchicum, as noticed above (§§ 110. 112.), ought to be added to the *cinchona* and the alkali. I have rarely found the above means fail of producing a very decided relief in the course of three or four days, when commenced early, and when no cardiac or other complication exists. But when a joint is attacked some external means, especially such as I shall hereafter suggest, may also be employed with advantage.

117. *B.* In more prolonged cases, and when the disease had not been seen during its early stage, instead of the colchicum I have prescribed the *aconite*, as noticed above, in the intervals between the taking of the *cinchona* and alkalies; and, in those cases where the patient has been reduced by the duration of the disease, or by vascular depletions, or where a deficiency of the red-globules of the blood was inferred, I have employed with marked advantage the *iodide of iron* in the syrup of *sarza*, and the compound decoction or fluid extract of *sarza*. This medicine was of the most remarkable and immediate service in the case of a medical officer from India which presented features of the greatest severity and obstinacy, no other substance, excepting an occasional purgative, having been required to

effect a cure, which took place in a very short time.

118. In the class of acute cases now being considered,—in the prolonged, neglected, or injudiciously treated, where the red-globules appear to be deficient, but where no internal complication or metastasis can be detected,—the preparations of *iron* with the carbonates of the *alkalies*, especially the *mistura ferri composita*, with the addition of the carbonate of potash or soda, will be found of great service. The following pills will also be most beneficial. If the bowels be confined, from five to ten grains of the extr. aloes purificat. may be added to the mass.

No. 332. *R.* Ferri Sulphatis gr. xij: Quinæ Disulphatis gr. xvij: Camphoræ rasæ gr. xij: Pulv. Capsici gr. vi. Pilulæ Galbani comp. 3j: Syrupi Tolutani q. s. misce, et contunde bene. Divide massam in Pilulas xxiv; e quibus sumantur binæ vel tres, ter in die.

119. *G.* When the disease attacks the large joints in the *capsular* or *sub-acute* form, the application of leeches has been advised, especially if external redness or swelling is observed. The practice is of service in recent attacks, and in young or robust persons, more particularly if the internal treatment be such as I have already recommended, or am about to suggest. The number of leeches* should depend upon the circumstances of the case; but the benefit derived from them will be only temporary, unless the internal means used at the same time be appropriate, and unless the rest of the external treatment following the application of leeches be suitable to the local affection. After fæcal accumulations and disordered secretions and excretions have been evacuated, the means already prescribed (§§ 116, et seq.) should be employed; and if the more acute symptoms lapse into the sub-acute, or if a joint becomes especially affected, or, if effusion within the capsule takes place, the decoction of *cinchona* may be given with the *iodide of potassium*, and the solution, or the sub-carbonate, of potash. In these cases, it is important to procure as speedy absorption of the effused fluid as possible, and thereby to prevent the irritating effects of this fluid on the membranes inclosing it. This end will be best obtained by subduing, by the internal means al-

* The mode in which *local blood-letting* is practised in the Shetland Isles is curious. I here adduce the description I have given of it in another place. I have seen a similar mode adopted by the native Africans on the Grain, Ivory, and Gold Coasts; the only difference being that, instead of a ram's horn, the chief instrument in the operation amongst the native Zetlanders, a small gourd is employed by the Africans, as it was from the earliest times in countries bordering on the Mediterranean.—“Mentio hujus rei, quæ quidem in insulis Zetlandicis mihi contigit vidisse, ea mihi in mentem reducit. Scarificatio et sanguinem ab ultimis usque temporibus hoc modo eliciunt:—Quam partem volunt scarificare, hanc aquâ calidâ foveant. Qui medici partes agit, is cutem sexies aut septies novaculâ perquam leviter perstringit, et cornu arietinum modicè recurvum, quod cucurbitulæ vice fungitur, apice perforato, et corio molli circumdato, partem leviter resectam applicat. Tunc foramini labia admovet, et quantum fieri poterit, aëra inclusum exsugit. Quom cornu exinanisset, corio torquendo et in foramen linguâ protrudendo aëris irruentis impetum prohibet. Postquam cornu partem scarificatam arripit, deinde pannos ex aqua calida paulum exsiccatos circa inum cornu superimponit, qui sanguinem ad partem provocent. Quom sanguinis semiplenum sit, cornu tum cutem relinquit et decidit. Eadem res iterum et iterum repetitur, donec satis sanguinis mittatur. Mulieres et mares, scarificatione et cornu hujusmodi uti vidimus. Res memoratu f. ristan digna est, ut enim Romani antiquiores cucurbitis, sic Getæ (sive quis eos Gothos nominare malit), et omnes eorum posterî, cornibus ad sanguinem eliciendum uti videntur.”

ready advised, the morbid action in the joint, by correcting the altered state of the circulating fluid, and by procuring a free discharge from the external surface of the joint. After the operation of leeches, in such cases as may appear to require them, or without having recourse to them in other cases, where they are contra-indicated by the local or constitutional symptoms, — when there is little or no local redness, and no marked increase of heat, but considerable intra-capsular swelling, — small or moderate-sized blisters may be placed near each side of the joint, as when the knee is affected, and these may be repeated, or kept discharging, according to the effects produced. In other respects, the treatment of this form of the disease, as well as of the other subacute states, may be conducted conformably with the views already entertained. It may however be remarked, that the preparation of iodine, conjoined with cinchona, alkalies, &c., or with iron, sarsaparilla, &c. when there is a deficiency of red globules, are more especially indicated in these forms of the complaint; and that colchicum, conjoined with the iodide of potassium, the alkalies and cinchona, in these forms, is often very beneficial, especially in the more active states. When the disease attacks the more superficial joints, leeches and blisters should not be placed immediately over the joint, but at a short distance from it, so as to occasion a derivation of the morbid action from the affected parts.

120. In some cases of acute and sub-acute rheumatism, I have employed the *oil of turpentine* differently from the manner noticed above. After having evacuated disordered alvine secretions and excretions, and given a few doses of the decoction of cinchona, with an alkali and nitre, I have occasionally prescribed this oil in the following, or in a similar manner; endeavouring, however, at the same time, to preserve the bowels sufficiently open, and to prevent the irritating action of the oil on the kidneys, by a liberal use of demulcents containing nitre and an alkaline carbonate: —

No. 333. R. Olei Terebinthinæ, ʒj; Sodæ vel Potassæ Bi-carbon. ʒj; Tinct. Cinchonæ Comp. ʒjss; Tinct. Capsici, ℥v; Aquæ Menthæ Piperitæ, ʒjss. Misce. Fiat haustus bis terve in die sumendus.

121. iii. THE CHRONIC FORMS of rheumatism, when they appear primarily, more especially in an *active form*, or with nocturnal exacerbations, should be treated very nearly on the principles now stated. — (a.) After evacuating morbid accumulations and excretions, the decoction of *cinchona*, or the *guaiacum* mixture, may be given with *alkalies* and with *colchicum*. The preparations of *guaiacum*, especially when thus combined, and after the biliary and alvine secretions have been duly evacuated and promoted, I have always found more or less beneficial in this state of the disease, as well as in the sub-acute and in the more *passive* conditions. The good effects of these are more certainly secured if free excretion by the several emunctories be promoted, by a liberal use of diluents, more especially those already mentioned (§ 103.).

122. (b.) In the states of the complaint now being considered, as well as in the advanced stages of the acute, and in the sub-acute and arthritic forms, manifest advantage will accrue from the *iodide of potassium* in such combinations as the experience and tact of the physician will suggest, — more particularly when given in the decoction

of bark, or in the *guaiacum* mixture, with the solution of potash, or of carbonate of potash, or with colchicum, or aconite. Besides the forms of the disease just mentioned, both the active and passive states of chronic rheumatism will be remarkably ameliorated by these means, which may be aided by the external measures about to be noticed, and by a suitable diet and regimen. In these states of combination, I have found the iodide of potassium extremely beneficial, and whilst less than two grains, given thrice daily, were rarely prescribed, more than five grains were as rarely taken at one dose; a free use of diluents being always allowed.

123. c. The *cod-liver oil* once enjoyed a considerable reputation for the cure of the sub-acute and chronic forms of rheumatism; and was much employed in Manchester since 1766, when it was first introduced by Drs. KAY and PERCIVAL. Owing to the writings of this latter physician, and the reports of Dr. BARDSLEY, it came into use in Germany, where it is now one of the most commonly used medicines for the chronic forms of the disease. The work of Dr. HUGHES BENNETT on this oil has revived the credit of this remedy for rheumatism; and it is now very generally prescribed for some obstinate states of the complaint. It has from time immemorial been employed as a popular remedy for this and some other chronic disorders, both in Norway and in the Shetland Isles; the liver of the torsk — the *Gadus brosme*, being however preferred to that of the cod — the *Gadus morhua*. The oil prepared in the manner described by my friend Dr. EDMONDSTON of Shetland, in his communication to Dr. HUGHES BENNETT, is that which I believe to be the best. This latter physician has adduced the opinions of the earlier writers on this oil, and added his own, which are both discriminating and judicious. Dr. PERCIVAL remarks, that he had the fullest evidence of the successful exhibition of it in rheumatic complaints, and considered it superior to the preparations of *guaiacum*. Dr. BARDSLEY, much later, 1807, states that he is enabled to speak of it, from long experience, “as a medicine of efficacious but limited powers. In some instances, where every means has proved unsuccessful, it has operated in a manner so decidedly beneficial as to excite astonishment.” The circumstances under which he found it most advantageous were, — 1st, in the chronic rheumatism of elderly persons, when the muscles and tendons have become rigid, and the joints nearly inflexible, owing to excessive labour, dampness, hard fare, and cold. — 2dly, In women whose constitutions have been worn out by repeated rheumatic attacks after parturition, and more especially in the decline of life. Dr. HUGHES BENNETT states that, judging from the mass of observations published in the German periodicals, and from what he has heard and seen connected with this subject, he considers this oil to be more especially indicated in three distinct forms of chronic rheumatism and gout, which may be denominated the general, erratic, and local.

124. I have prescribed the *cod-liver oil* in several cases of rheumatism since 1844, and chiefly in similar cases to those mentioned by Dr. BARDSLEY, and certainly with nearly similar results; the quantity having been from two to three or four table-spoonsfuls in the course of the day. It was commonly taken on the surface of milk, of cold

coffee, or mint-water, or of some aromatic water; and, in some cases, on the surface of the infusion of orange peel, to which a small quantity of the iodide of potassium was added. In two cases of sciatica in elderly persons it was quite successful; but in two cases of erratic chronic rheumatism, for which the patients had been, and still continued, in the habit of resorting to opium, the oil had no effect. Was this result to be ascribed to the influence of opium on the system? Much useful information on this subject will be obtained from Dr. H. BENNETT's treatise referred to in the BIBLIOGRAPHY to this article. (*Op. cit.* p. 70—92.)

125. (*d.*) The *compound decoction of sarza*, or the fluid extract of sarza, largely diluted, especially when conjoined with the solution of potash, or the sub-carbonate of potash, and the iodide of potassium, I have found one of the best medicines for the cure of the chronic and sub-acute forms of rheumatism. In order, however, to secure the good effects of this combination, the functions of the skin should be freely promoted by regular exercise in the open air; and the other secretions and excretions ought also to receive due attention. I have preferred the compound decoction of sarza to other preparations, in doses of about six ounces or half a pint, twice or thrice daily, as it produces a much more decided effect upon the skin, especially when taken in a tepid or warm state.

126. (*e.*) The *decoction of senega* is also often extremely beneficial, when conjoined with the iodide of potassium and potash, and with some aromatic water, which will enable the stomach to tolerate this decoction in full doses. In the complications of rheumatism with endocarditis or pericarditis, the combination of this decoction with the substances just mentioned is often most beneficial. It was found most efficacious in several cases of this complication which came under my care, two of these cases having occurred in medical men. Whilst this decoction, especially as thus combined, promotes the excretions, it also tranquillises the increased action of the heart. It may be given in the sub-acute, as well as in the several forms of the chronic disease.

127. (*f.*) The *Datura stramonium*, or thorn-apple, first employed for rheumatism by STOERCK, and subsequently by WEDENBURG and ODHELIUS, and by COOPER and BARTRAM in America, has been found of service in the chronic and sub-acute forms of the complaint; and especially in sciatica, and other cases of nervous rheumatism. It may be given in the form of extract, thrice daily, commencing with a quarter or half a grain, and increasing the dose until dilatation of the pupil and giddiness are produced. I have prescribed this medicine in a few cases; but although it had considerable effect in alleviating the pain, the benefit derived from it was generally transitory. The *Rhododendron chrysanthum* has been recommended for the sub-acute and chronic forms of rheumatism by PALLAS, HOME, KOELPIN, LOEFFLER, WILLIMET, and others. I have no experience of its use in this disease, but Dr. CRAIGIE remarks, that two drachms of the dried leaves may be infused in ten ounces of boiling water all night; and the strained liquor may be taken either at once, or in divided doses during the day; and that a repetition of the remedy for three or four days in succession generally effects a cure in the forms of

the complaint just specified. Very probably this infusion, as well as the extract of stramonium, may prove much more beneficial when conjoined with alkaline medicines, or with other substances already mentioned, than when given alone; but under any circumstances the effects should be carefully watched.

128. (*g.*) *Arsenical preparations* have been recommended for the more chronic states of rheumatism, by JENKINSON and others. Dr. BARDSLEY considered them to be of essential service in these states of the disease when conjoined with opium. I have recently given, in a very few instances, the combination of the iodide of arsenic and mercury — the liquor iodidi arsenici et hydrargyri as prepared in DONOVAN's solution, both with and without opium; and in these this solution appeared of service; but it requires a further trial before a decided opinion as to its merits in this disease can be given.

129. (*h.*) *Naphtha* was prescribed for chronic rheumatism by THOMANN; and several forms of *bitumen*, *rock-oil*, or *Barbadoes tar*, or *petroleum*, have also been employed, most frequently as popular remedies. The petroleum is used both internally, as a sudorific, in doses of from ten minims to half a drachm, three or four times daily, and externally as a liniment or embrocation. The substance called *British oil*, procured by distillation from the stone-coal of Shropshire and Wales, and the empyreumatic oil obtained during the formation of coal gas, are also popular remedies for this complaint. Of these I have had no experience, but I have seen very decided benefit produced by the use of *tar-water*, and of the *Norwegian tar*, this latter being taken in the form of pill with liquorice-root powder and magnesia. The exaggerated accounts of the virtues of tar and tar-water, which appeared at the commencement of the last century, and the ridicule to which the use of it was soon afterwards subjected, have led to the disuse of a substance which is calculated to produce very salutary effects when judiciously employed, not only in chronic rheumatism, but also in several chronic and cachectic diseases.

130. (*i.*) Besides the cod-liver and empyreumatic oils just mentioned, several *vegetable* or *essential oils* have been recommended by writers, both internally and externally, for rheumatism. I need not here add to what I have already stated in favour of *turpentine*. It was many years ago praised by KOELER and myself as an internal and external remedy for this disease; and the *cajeput oil*, much used in the East, and brought to the notice of European physicians, is often a useful adjunct to turpentine, especially in the external use of this latter substance. It should not be overlooked that *olive oil* was recommended both internally and externally for chronic rheumatism by BROCKLESBURY; and, when taken frequently, or in sufficient quantity, and so as to preserve a regular state of the intestinal secretions and excretions, it is certainly of considerable service.

131. (*k.*) *Sulphur* has long been employed as a popular remedy in both the active and passive states of chronic rheumatism, although it has been overlooked by writers with reference to this complaint. The precipitated sulphur may be taken nightly, either alone, or with the carbonate of magnesia, this combination being preferred when, with a dry or harsh state of the skin, there is fla-

tulence or acidity of the *prima via*. It exerts a very decided effect upon the functions of the skin, both promoting and altering the excretions from this surface — an intention of the greatest importance in the chronic and sub-acute forms of this complaint. I have usually prescribed the following every night, exhibiting occasionally, or once in the week, a purgative draught in the morning, consisting either of the compound decoction of aloes, or of equal parts of the compound infusions of senna and gentian with sulphate of magnesia, &c.

No. 334. R. Sulphuris præcipit. ʒvj; Magnesiae Carbon. ʒss; Pulv. Rad. Glycyrrh. ʒjss; Pulv. Zingiberis ʒj. Misce. Capiat æger cochl. j vel ij minima, in aquæ vel lactis pauxillo, omni nocte.

132. iv. OF VARIOUS OTHER MEDICINES WHICH HAVE BEEN ADVISED FOR THE SEVERAL FORMS OF RHEUMATISM. — Having noticed the plans and means of cure most appropriate to the principal forms of rheumatism respectively, I shall briefly mention some others which have been employed more indiscriminately, especially by some writers; and remark upon their application to certain states of the complaint, *before I proceed to notice those external measures and regimenal means which have, at sundry times and by numerous authors, been recommended to the profession and the public.*

133. (a.) *Of purgatives*, little mention may be here made beyond what has been stated when treating of acute rheumatism (§ 102.). This class of medicines was much employed in the several forms of the disease by RIVERIUS and BUCHHAVE, and in the bilious complications by STOLL and others. They are certainly required in all circumstances, especially early in an attack; but only to the extent of completely evacuating all fecal accumulations, and morbid secretions and excretions, and of preserving and promoting a free discharge of these. If employed beyond this intention, they may reduce vital power and resistance, without producing any beneficial effect on the disease in any of its forms. The choice of purgatives and aperients in this complaint is always a matter of importance. — I have already remarked on this topic (§ 102.), but I may here add, that the stomachic, warm, or cardiac, should be preferred, and that these may be conjoined with alkalies or other deobstruents.

134. (b.) *Emetic tartar* was much employed in small doses by BROCKLESBURY, and much more recently by BALFOUR, in all the forms of the complaint; but it has most commonly been conjoined with opium or with other diaphoretics. Unless James's powder, it is the only preparation of antimony on which reliance should be placed in this complaint. It is most appropriate in hot, dry, or harsh states of the skin; when the pulse is tolerably strong and full, and when the cutaneous excretion has been suddenly suppressed; but attempts at the restoration of this excretion should be made by other diaphoretics, when constitutional power is much depressed, and the pulse is very rapid or compressible, more especially by the liquor ammoniæ acetatis, with excess of ammonia, with camphor, and with the spiritus ætheris nitrici in full doses.

135. (c.) Various *narcotics* and *sedatives*, besides those already noticed, have been advised for the several forms of rheumatism. Of the preparations of *opium*, *morphia*, &c., as well as those

of *colchicum*, I may here remark, that they should rarely be confided in alone, or given, unless in such combinations as will promote their excreting operations — the former by the skin, the latter by the intestines and kidneys, — and at the same time prevent, especially as regards *colchicum*, their depressing influence on the nervous system, the combination with ammonia being one of the best which can be employed. In chronic forms of rheumatism, the preparations of *colchicum* are productive only of temporary benefit, and are often prejudicial, unless conjoined with cinchona, or quina, or with guaiacum, or with camphor or alkalies. *Aconite* is most appropriate to the more acute states of the disease, and to certain complications about to be noticed. *Conium*, which was praised by STOERCK, has comparatively little influence, unless continued in considerable doses. It is most serviceable in the forms of rheumatism which occur in females, and which are consequent upon suppression, interruption, or difficulty of the catamenia; and in these circumstances the *stramonium*, and even *digitalis*, are often of service, especially when conjoined with aloetic aperients, or with the iodide of iron, or with the biborate of soda, or with capsicum, according to the peculiarities of the case.

136. (d.) Several *stimulants* have been advised for the more chronic states of the disease. — *a. Phosphorus* was recommended by BUCHNER and HUFELAND; but it is a too hazardous medicine to deserve adoption unless with great caution. The phosphoric acid, which may be employed with safety, has not been hitherto prescribed for this complaint. Probably neither this acid, nor the mineral acids, may be appropriate in rheumatic cases, unless in as far as they may promote the digestive and primary assimilative functions, and may thereby prevent the generation of the lactic and uric acids. — *β. Assafætida* was praised by THEDEN in the chronic states of the disease; and certainly both it and several other of the *gum-resins* and *balsams* are not devoid of efficacy in these states, especially when used as adjuncts to other appropriate means. I have prescribed the *Peruvian balsam* in some instances with very decided success. — *γ. Mezereon* has been employed by some writers; but it is in combination with *sarza* and *sassafras* and *guaiacum*, as in the compound decoction of *sarza* that it is most serviceable. — *δ. The geum urbanum* has been recommended by BUCHHAVE; the *solanum dulcamara* by LINNÆUS, PRESSAVIN, and VIEUSSEUX; and the bark of the *magnolia glauca*, which is tonic and aromatic, by BARTON. An infusion of either of these may be made the vehicle of other medicines, may promote the cutaneous functions, and, by this operation, as well as by their stimulant and tonic action on the organic nervous system, may remove attacks of the disease. — *ε. The trifolium fibrinum* was praised by AASKIEM and BROCKLESBY in the form of infusion, with the volatile tincture of guaiacum. — *ζ. The Phytolacca decandra* was prescribed by BARTON. My friend Professor DUNGLISON remarks, that it is celebrated as a remedy for chronic rheumatism, and is given in the form of tincture of the ripe berries. An infusion and an extract of the leaves of the *Taxus baccata*, or yew tree, have been given in this complaint, but I am not acquainted with the results. — *η. The powder or extract of nux vomica* has

been recommended by OBERTEUFFER in chronic rheumatism, and for the removal of the stiffness and partial palsy of the limbs often attending the complaint. I have tried the alcoholic extract in a few instances, in doses of a quarter of a grain increased to a grain, twice or thrice daily, preferring it to strychnine. It will be found of service in very chronic cases, when aided by other means; but it is apt to produce headache, which, however, may sometimes be prevented by conjoining it with aperients, as the purified extract of aloes, soap, and the ox-gall.—*Capsicum*, or Cayenne pepper, was praised by ADAIR. It is the common resource of many of the dark races, especially the Negro, in all the chronic and sub-acute states of rheumatism; and, whilst they use it abundantly internally, they apply it externally over the pained part. I have frequently had recourse to it; but chiefly as an adjunct to other means, and it has in this way always appeared to be of service.—*Mustard seed* has also been given by ADAIR. About 1825 it was an almost universal popular medicine, not only for rheumatism, but for all diseases. It soon, however, fell into disuse; most probably because it really possessed some claims to attention in chronic rheumatism.*—The *æthers* and *ætherial preparations* have been prescribed for the several forms of rheumatism, but chiefly as adjuncts to other means; and probably *chloroform* will soon be added to the list of means available in the more acute or neuralgic states of this complaint, and be exhibited either by the mouth or by inhalation, the former being obviously the safest method.

137. v. OF VARIOUS EXTERNAL MEANS RECOMMENDED BY WRITERS.—All external means of cure, unless employed as adjuvants of internal remedies, and judiciously prescribed, are attended, either immediately or remotely, by more or less risk. Rheumatism, in all its forms, is an external manifestation of a constitutional malady, in which the organic nervous and vascular systems and blood are chiefly affected; and if this manifestation be suppressed in one quarter, before the evil is removed in the systems more especially implicated, it will most assuredly appear in some other quarter, and not improbably in some important or vital organ. External means, excepting such as promote the depurating functions of the skin, ought therefore never to be resorted to unless in aid of, and contemporaneously with, or consecutively of, appropriate internal or constitutional treatment.

138. (a.) Of the numerous external means and applications which have been recommended for the different varieties of this disease, the selection is most difficult; and it should be guided entirely by the peculiarities and duration of the attack. The number of these means, although not so great as that of internal remedies, is almost sufficient to

distract the inexperienced when an attempt is made to employ them appropriately to the circumstances of the case. Yet will a due knowledge and recognition of these circumstances and peculiarities prove the best guides to the selection of them, and to the periods of having recourse to them, this knowledge constituting the best kind of experience; for without it experience is only gross empiricism. The enumeration of this class of means may, in itself, appear somewhat formidable; but it will furnish, with the remarks which I shall append to each, an imperfect guide, upon which the reflecting practitioner will make the required improvements when he comes to apply them to practice.

139. (b.) *Acrid topical applications* of various kinds, and *irritating plasters*, have been employed empirically as domestic means, and prescribed professionally. LENTIN and others have recommended them; but BANG, the very practical writer of Copenhagen, considers them not devoid of risk, unless they are prescribed in aid of judicious internal remedies. Sinapisms, the moistened bark of the mezereon, and various similar applications have been resorted to, and often with benefit, *when vital energy is duly supported, and when the excreting functions are promoted at the same time*—a principle of cure which ought never to be overlooked in the treatment of diseases caused by depressing causes, and attended by pain and impaired power, as well as by morbid states of the circulating fluids.

140. (c.) *Acupuncture*, or the gradual introduction of a sharp and fine needle or metallic wire through the integuments down to the seat of the complaint, in very painful cases of muscular or aponeurotic rheumatism, has been practised for many ages in the far East, especially in Japan and China. It was treated of, and the safety of the practice shown, as well as the temporary efficacy of it, by Mr. CHURCHILL; and it was also frequently employed in France. I have seen it resorted to in several instances with some success; but I am not aware of much permanent benefit having been produced by it. The practice has fallen into its deserved disuse.

141. (d.) *Artificial eruptions* have been resorted to in rheumatism, more especially in chronic and sub-acute cases, by THILENIUS, LENTIN, PIDERIT, VICAT, ANTENRIETH, and JENNER; and emetic tartar, added to an ointment or plaster, has been commonly used to produce these eruptions, which, however, especially when plasters have been employed and allowed to remain too long, or when the constitution has been cachectic, has sometimes been followed by foul, spreading, and obstinate ulcers. If resorted to at all, they should be watched; and they ought not to be produced immediately over a joint, although they may be brought out in the vicinity, in obstinate cases. I tried them many years ago in dispensary practice, in several internal complications of rheumatism, with but little or doubtful advantage.

142. (e.) *Baths, warm, vapour, and medicated*, have been long recommended for the more chronic cases of the disease. Of thermal mineral baths mention will be made hereafter, but considerable advantage will often be derived from warm baths, which may be prepared at any place, under due direction; and which may be general or local, according to the peculiarities of the case. *Warm*

* A credulous disposition to believe in quackeries of some kind or other—religious, political, and medical—is inseparable from the English character; and the more absurd the doctrine, the more ridiculous the means, the more gross the humbug and imposture, the more credence such impositions acquire, and the more generally are they adopted, not by the ignorant only, but by the elevated in rank and social position more especially. The public resemble a flock of sheep, of which, when one breaks off in an eccentric direction, all run the same way. A facetious contemporary would be inclined to impute this tendency to the quantity of mutton annually devoured by our countrymen.

baths, at a high temperature, or *vapour baths*, are generally most beneficial in chronic, passive, or cold states of the complaint, and for these the addition of salt or mustard, or both to the warm bath, whether general or local, will be of service. Even when *sea water* is used for a warm bath these additions are often of service, especially when the regimen and internal treatment is judicious. But baths are not confined to chronic cases only. Even in the sub-acute and acute states benefit will be derived from warm baths of a somewhat lower temperature, or tepid baths, containing an *alkali*, or *alkaline sub-carbonate*. Indeed *warm alkaline baths* will be found useful in both states of the disease, and more particularly when the skin is hot, dry, and harsh, during the evening and early part of the night.—*Vapour-baths*, both general and local, have been much recommended by DU MOULIN, BARDSLEY, and BLEGBOROUGH, and their efficacy is undoubted in chronic cases, especially when the joints are affected, and when aided by a restorative treatment and regimen, and due exercise in the open air.—*Sulphur baths* have been employed with marked benefit in similar cases; and warm baths containing the sulphuret of potash have also been resorted to. These baths, general or local, or in whatever way they may be *medicated*, should be employed chiefly in aid of judicious internal treatment, and of a proper regimen.

143. (f.) The *warm douche* and *vapour applied locally*, have been found of service in many cases; but the remarks just offered are equally applicable to the use of these. To obtain advantage from them, they ought to be daily employed, to be followed by friction, exercise, and warm clothing, and accompanied by the internal treatment recommended above.

144. (g.) *Blisters* have been generally employed as external or local aids of constitutional means; but unless these latter means are appropriate, the benefit derived from blisters is only temporary. FOWLER, ROUPPE, and others, have advised them; but HUFELAND, finding the advantage procured from them by no means permanent, recommended them to be kept open by the substances usually employed for this purpose. Blisters are seldom of use early in acute attacks; they are most useful towards the decline of the disease, and when the action of the several emunctories has been duly promoted. They are more beneficial in sub-acute cases, and when the joints are affected; but they should not be employed immediately over superficial joints, but only near to them. The repeated application of blisters is generally preferable to keeping them open.

145. (h.) *Embrocations, liniments, and rubefacients* of various kinds have been employed, both empirically and with rational intentions, as aids in the cure of the several forms of rheumatism. They have been even resorted to as the only means, and often as popular remedies and without medical advice. Several nostrums are employed in the form of embrocation or liniment; and, although relief has often been procured by them, yet their inappropriate use, and the application of them whilst the morbid conditions of the nervous and vascular systems remained unabated, have been followed in some cases by dangerous and even fatal consequences, — by internal complications, or by the supervention of disease of internal

surfaces or organs, with effusions or adhesions. A few instances of these results have come under my observation, and have demonstrated the danger of having recourse to means which may suppress the local manifestation of a constitutional evil, without having prescribed judicious internal remedies for that evil, and without having employed agents calculated to throw off or to resist the tendency to internal complications. It would be endless, and of doubtful advantage, to enumerate the various embrocations, liniments, and rubefacients which have been praised for the several forms of the complaint. Most of the *formulae* comprised under the head *Linimenta*, in the APPENDIX (Form. 295—314.), may be used also as embrocations and rubefacients in this disease with great advantage, when a judicious internal treatment has preceded, or accompanies, the use of them. Under such circumstances warm *rubefacient poultices*, and *rubefacient plasters* will also be found of service, more especially in chronic cases.

146. (i.) *Frictions, shampooing, percussion, and flagellation*, have been much employed in the more chronic and obstinate states of the complaint; but these means, especially frictions and shampooing, are most serviceable after warm salt-water or medicated baths. The frictions may be only simple, as with the hand, or with sweet oil, or with variously prepared oils or liniments, or with the hard Indian glove, or with the hair brush, or with any of the liniments prescribed in the APPENDIX. *Percussion* not infrequently relieves for a time the chronic pains of muscular or aponeurotic parts; and *flagellation* may have a similar effect; but it has been little used since the practice of medicine was rescued from the hands of monks in the dark ages, although it was employed by the ancients.

147. (k.) *Galvanism and electricity* have had numerous advocates in the chronic forms of rheumatism; and they are sometimes of service, especially *electro-magnetism* in the more passive states of the chronic disease. Several recent writers have furnished evidence in favour of the use of magnetic electricity in these forms of the complaint; but I am unable to give an opinion respecting it from my own experience. I have, however, seen benefit derived, in a few instances, from Galvanic electricity.

148. (l.) *Insolation*, or exposure of parts affected with chronic rheumatism to the sun's rays, has been advised; and I have prescribed it with benefit in the passive or cold form of the complaint. The effect probably depends not merely upon the warmth thereby produced, but also upon the electrical agency of the sun's rays. Much of the benefit derived from migrating to a warm climate in cases of obstinate rheumatism arises from this cause; but the change should be made to a dry climate and a clear atmosphere; for if the situation abounds in humidity or malaria, however warm it may be, the rheumatism will still continue, or even be aggravated.

149. (m.) *Issues and setons* have been mentioned favourably by some of the writers who have recommended the production of artificial eruptions for this complaint. They are rarely required, or submitted to, in cases of simple chronic rheumatism; but I have prescribed them with marked advantage in certain of the complications, or internal extensions, of the disease, more especially during, or subsequent to, rheumatic endocarditis

or pericarditis; or when the spinal membranes have become affected. They are also of use in sciatica, and when the large joints are implicated, and in these cases they have been recommended by BARDSLEY; but they should be prescribed in a suitable situation, so as to produce a derivation from the part or joint itself, and yet not be far removed from it. Two or even three issues may be required in some cases.

150. (n.) *Moxas* have been recommended, from the most remote times in the far East, for chronic rheumatism, especially when seated in the joints; and they have been praised by THILENIUS, BESE, PASCAL, NAUDAU, and more recently by LARREY, DUNGLISON, and BOYLE. They are often of service when applied in the situations advised for issues, and when a puriform discharge from the parts cauterized by them is obtained. They, as well as issues and setons, are suitable to the more chronic cases, or rather to the effects of rheumatism, than to recent attacks.

151. (o.) *Mineral waters and mineral baths* are amongst the most beneficial and popular remedies for the several states of chronic rheumatism. Much of the benefit derived is, however, due to the change of climate, air, scene and occupation consequent upon visiting watering places. The natural thermal springs have been most generally recommended for the more chronic and obstinate states of chronic rheumatism, and for sciatica, especially those of Bath and Buxton in this country; of Wisbaden, Baden-Baden, Karlsbad, &c. in Germany; of Bareges, in France; and of several in Italy. The chemical composition and temperature of these several springs, will suggest the propriety of having recourse to them in the circumstances of each case; and it is chiefly with a strict reference of this composition to the peculiarities of individual cases, that a selection of both thermal springs and of other mineral waters should be made. Much information will, however, be obtained on this topic from the writings of FALCONER and BARLOW on the Bath waters; from those of ROBERTSON and SCUDAMORE on the waters of Buxton; from those of GRANVILLE, OSANN, LEE, and GAIRDNER, on the German thermal springs; and from CARMICHAEL'S account of the water of Bareges and Bagnères de Bigorres. Not only may these waters be taken internally, but they are still more beneficial when used as general or local baths, or in the form of douche. The duration of these baths should depend upon the strength of the patient. It should be short at first, and prolonged with repetition; but benefit will seldom be derived until a number of baths have been taken. The circumstances of the case should, however, suggest both the duration and the frequency of them. The same remark applies to the use of the douche. Immediately after the bath or the douche, the surface should be rubbed with dry hot towels; and the patient wrapped up in flannel or in blankets, so as to promote, for several hours, a copious perspiration. The use of warm chafebeate baths in chronic states of the complaint was much insisted upon by BRANDIS; of the waters of Reibburgh by ALBERS; of sulphureous waters and baths by many writers; and of numerous mineral springs by authorities of every kind, some of which will be found in the *Bibliography*.

152. (p.) A form of *physical training* has lately

come into vogue for chronic rheumatism and other chronic ailments, more especially such as result from dissipation, excesses, irregularities, &c. of various kinds; and this training, conjoined with change of air, occupation, scene, and mode of living, forming part of the system, and with bathing, the copious use of diluents and exercise, so as to produce a very free cutaneous discharge, is often productive of marked benefit, which is the more striking in those obstinate cases—which have often become obstinate from the fault and neglect of the patient, and from recourse having been had to many physicians in succession without allowing any one of them time or opportunity to employ the salutary resources of science. What, however, is denied the honest advice of a physician, is readily accorded by the patient to the confident humbug of the charlatan, especially when it is sought for at a distance, and acquired at an expence which is felt as a recommendation, although the only one. Regular modes of living, active and regular exercise, temperance, and a copious use of diluents, a free excretion from the skin, procured by baths, diluents and exercise, and change of air, of occupation and of scene, have been recommended by physicians in all ages for many chronic complaints; but they have generally been imperfectly followed out, or partially adopted, or altogether neglected, by those for whom they were prescribed. When, however, they were ushered to the public, sane and insane, as the results of inspiration; were surrounded by appliances calculated to excite the senses of the weak-minded, to attract the credulous, to allure the idle, the frivolous, and the intriguing, and to strike those whose consciousness reach but little further than their sensations, and who are incapable of observing and of reasoning on facts and occurrences; and when they were moulded into a plan, and popularized under the name of "*water-cure*;" and were thus recommended by every means of publicity to that largest class of the community now specified as an universal remedy, beyond all remedies the most efficacious, then were the results such as might have been anticipated by the philosophic observer of human nature, and of the constitution of the human mind as influenced by existing states of society. The most remote of these results already appear in a more accurate estimation of this universal "*cure*," and in the recognition of the fact, that of all the "*vanities under the sun*," the greatest and the shortest lived are those by which charlatans gull the public, and jeopardise not only the lives of the credulous, the thoughtless, and the worthless, but also the most important interests of families.

153. (q.) *Sulphur*, in the form of sulphur fumigation, the oil of sulphur of former times, and the *carburet of sulphur*, have been locally or externally employed for the more obstinate forms of this disease. ORTO, of Copenhagen, recommends, either alone or in conjunction with vapour baths, two drachms of carburet of sulphur in half an ounce of rectified spirit of wine, four drops of which are to be taken internally every two or three hours, and the parts affected to be rubbed with a liniment consisting of two drachms of this carburet and half an ounce of olive oil. This treatment is most suitable to those cases in which the secretions and excretions have been duly improved and pro-

moted by the appropriate means before it is entered upon.

154. (r.) *Urtication*, or stinging, or flagellation with nettles, has been advised for chronic rheumatism as well as for some forms of palsy, by many of the older writers; and it has in more recent times been prescribed by HUFELAND. It may be resorted to with advantage after warm or vapour baths; or in similar circumstances to those in which other rubefacients and external derivatives have been recommended, as warm terebinthinate embrocations, &c.

155. vi. TREATMENT OF THE COMPLICATIONS OF RHEUMATISM.—A. It has been stated above that acute rheumatism may extend to the *membranes of the brain*, the disease either continuing in its more external seats, or subsiding in, or disappearing from these (see §§ 50 and 51.). When head symptoms occur in the course of acute or sub-acute rheumatism, the chief object is first to ascertain the cause and nature of this complication; to determine in how far it may be caused by the treatment; and to observe the evidence for or against the existence of inflammatory action in the membranes, or of simple nervous disturbance, or of a combination of both. Delirium, if slight, wandering, and nocturnal, the external disease continuing but little or not at all ameliorated, may arise from the narcotics prescribed, or from too lowering or depressing agents, or from the exacerbation of the fever (see § 50.); and in these circumstances the indications are obvious. Violent or distracting pain in the head may also depend on the same causes, and be removed by similar means to those which these indications suggest, or by such as are prescribed for this form of headach at another place. (See Art. HEADACHS, §§ 50, *et seq.*) But when the head-affection appears to be dependent chiefly upon inflammatory action in the membranes, then the subsidence of the external disease, especially that of the joint, will indicate its nature and the danger of effusion. In these circumstances, whilst active revulsion or derivation should be attempted by sinapisms applied to the parts affected previously, local depletions should be ordered, and be followed by blisters on the nape of the neck and occiput, or behind the ears. Calomel and antimony, purgatives and terebinthinate enemata ought also to be administered; and if somnolency or sopor, or coma be threatened, the head should be shaved and surrounded by a cloth which has been just soaked in spirit of turpentine, or which is imbued with an embrocation consisting of equal parts of the terebinthinate and compound camphor liniments.

156. B. *The complications with the several forms of cardiac and pericardiac inflammations and their consequences* are the most frequently met with in practice (§§ 48 and 49.). The nature and treatment of these complications have been so fully discussed when treating of diseases of the heart, that I have left nothing to add respecting them at this place. I may however remark, that further experience has proved the accuracy of the opinions I then stated; and the propriety of employing the means of cure there advised. Rheumatic endocarditis and pericarditis, so common in children and young subjects, especially in cold, humid, and variable climates, depend chiefly upon the fashions in clothing; upon low, damp, and ill-ventilated places of abode; upon modes of living;

and more especially upon the unnatural practice of hardening children by exposure and by fashions in dress. Hence the necessity of avoiding these causes, and of pursuing a treatment calculated to diminish or remove morbid effusion or change of structure, and at the same time to improve the constitution of the blood, and to promote vital action and constitutional powers—objects which may be attained, when these complications occur in young subjects; although they may be only partially or contingently accomplished in older subjects. (See *Treatment of Rheumatic Endocarditis and Pericarditis*, in Art. HEART and PERICARDIUM, § 144. *et seq.*)

157. It is not unusual to meet with cases, in which this complication has occurred in early life, or has appeared at some previous period, the acute rheumatic attack having been entirely removed, but the cardiac or pericardiac affection continuing either with or without detection. In some cases which have come under my observations, for very many years after the rheumatic fever, complicated as now stated, had occurred, and even after every rheumatic symptom had disappeared, little or no ailment had been experienced, until shortness of breath on exertion, or dropsical effusion evinced the mischief produced in the heart. In other cases, however, attacks of acute or sub-acute, or chronic rheumatism, have followed at periods more or less remote from that attack in which this complication first appeared, generally aggravating the cardiac or pericardiac lesion, but not having always this effect; for I have met with instances, one of them in a medical man, in which an attack even of acute rheumatism has not increased the organic disease of the heart which had taken place during a previous seizure.

158. A reference to the histories of cases of this complication, which have come under my care in the course of a practice of thirty years, and of which I have preserved notes, suggests their classification as follows:—1st. Cases in which rheumatic fever complicated with cardiac disease had been experienced in early life, but many years had passed without any ailment having been experienced until shortness of breathing on exertion and dropsy ultimately supervened, the patient dying of the cardiac disease, no second attack of rheumatism having occurred. In a case now under my care, twenty-three years elapsed between the rheumatic fever thus complicated and the present developed state of the organic disease of the heart, no rheumatic disease or other ailment having been experienced during all these years, although the cardiac affection had been slowly progressing until it has reached its present state.—2d. Some years after the occurrence of this complication, the cardiac disease still existing, latent or detected, another attack of acute rheumatism has supervened, and has aggravated the cardiac complication, or even diminished the physical signs and symptoms of this complication, these different effects depending much upon the treatment and constitution of the patient. I have thus seen two attacks of rheumatic fever take place after intervals of years; the cardiac complication at last destroying the patient. In the case of a medical man, two such attacks, after intervals of some years, have left the cardiac disease, in respect of both the physical signs and the symptoms, much less extensive and severe than when I first saw him, fifteen years

ago. — 3d. Much more frequently the patient who has experienced an attack of cardiac disease in the course of, or consequent upon, rheumatic fever, has suffered recurrences of the rheumatic affection in a slight or chronic form, without any very manifest aggravation of the cardiac disease, which, however, has either slowly advanced, or has proceeded more or less rapidly according to his habits, modes of living, constitution, and treatment. — 4th. In several instances, rheumatic fever has occurred in early life, accompanied or followed by a cardiac complication, and no second attack of rheumatism has appeared, or merely slight or chronic rheumatic affection; but the cardiac symptoms, as well as the physical signs of cardiac disease, have gradually subsided until they have, after several years, nearly altogether disappeared, or have been attended by little inconvenience.

159. It is obvious that, in these several states of complication, the exact nature and extent and consequences of the cardiac and pericardiac lesions, demand the chief attention; and that the treatment of whatever rheumatic affection may be present should be a secondary object. Fortunately, however, the very means in which I have for many years confided in for the several forms of rheumatism, are also such as are most serviceable in the cardiac lesions most commonly associated with them. After what I have stated, when treating of diseases of the HEART and PERICARDIUM (see §§ 144. *et seq.*), I need only enumerate some of the most efficient means which may be prescribed in these complications, and which moderate powers of observation will enable the physician to apply to the peculiarities of particular cases. Upon the approach, or in the early stage of the cardiac complication, *calomel* with *opium*, or with *aconite*; or the tincture or extract of *aconite* with *biborate of soda* or with *alkalies*; spirits of *turpentine* given by the mouth; alkaline *aperients* with *colchicum*; *camphor* with *digitalis* and *henbane*; the *alkalies* in large doses with demulcents and diluents, and external revulsion, are most efficacious in preventing the deposition of lymph or fibrine, and the effusion of fluid. At an advanced stage, when either fibrinous lymph, or serous fluid, has been effused, or when hypertrophy has followed obstructive or other changes of the valves and orifices of the heart, then the *iodides* of mercury or potash; *borax* in camphor mixture; the *iodide of potassium* and the solution, or carbonate, of *potash*, with the compound decoction of *sarza*, or the decoction of *senega* and an aromatic water; *camphor* with *digitalis*, and with either of these decoctions, or with the infusion or tincture of hops; the *iodide of iron* in the syrup of *sarza*; and an issue or seton near the margin of the ribs, are the means in which I have most confided.

160. C. When the membranes of the spinal chord are affected (§§ 52, 53.), the treatment should depend much upon the duration of the disease in this situation. If the patient be seen early, local depletion, chiefly by cupping, followed by *calomel* and *opium* with *colchicum*; by purgatives and terebinthinate enemata; by terebinthinate embrocations in the course of the spine, and by blisters, are most serviceable. If the case come under treatment at a more advanced period, or if the above means have failed, partial palsy or paraplegia, or other symptoms of increasing

congestion, effusion of lymph or pressure on the chord appearing, issues or setons in the back or loins; the bichloride of mercury, or the iodide of potassium, in the decoction of *sarza*, and the other means advised in the articles on Palsy and SPINAL CHORD, will then be appropriate.

161. D. When the *diaphragm*, or either its *pleural* or *peritoneal* surfaces are implicated, or when the costal *pleura*, or the *peritoneum* (§§ 54, 55, 56.) reflected over the abdominal parietes, is attacked, the lymph thrown out soon excites inflammatory action in the opposite parts of these membranes, and agglutination of the surfaces soon follows. This complication not infrequently came under my notice many years ago in public institutions, the affection of these surfaces having been an extension of disease from the adjoining parts, the tenderness and pain of which often masked the more internal mischief. When, however, the diaphragm is implicated, the symptoms of diaphragmitis are generally present in a very manifest form (see Art. DIAPHRAGM, § 9. *et seq.*). In these associations of the disease, the means already advised, especially local depletions, *calomel*, *colchicum*, and *opium*; terebinthinate embrocations, blisters, issues, &c., and various other means recommended in the articles on inflammations of these surfaces and on their consequences, may be resorted to. In many instances, these forms of disease are not brought before the physician until they have arrived at advanced or chronic states — until effusion, adhesion, &c. have taken place; and then a judicious and persevering treatment will be required to produce any amelioration, aided by change of air, by suitable diet, and by whatever may promote the general health and constitutional power. In many cases, however, the iodides already mentioned, taken in suitable vehicles; bichloride of mercury in small doses with *sarza*; alkaline solutions with iodides; Plummer's pill, with soap and *taraxacum*; repeated applications of the terebinthinate embrocation; repeated blisters, and issues, when aided by proper regimen, will be productive of some benefit. These external means are more efficacious than the application of the tartar-emetic ointment, which I have not found of much service in these cases.

162. E. The association of affections of the sexual organs with rheumatism, or the supervention of the former upon the latter (§ 57.), requires means adapted to the states of sexual disorder, such disorders being duly considered under their respective heads. But, in respect of these, as of other associations of internal disease with rheumatism, it should not be overlooked, that it is not only such internal disease which requires appropriate treatment, but also the rheumatic diathesis — the constitutional affection, whether depending upon or seated in the organic nervous system, or in the blood, or in both, — and to this diathesis, and to the conditions constituting and indicating it, our means of cure should also be directed; using means calculated to support the vital power of this system, and to remove the morbid conditions of the blood — objects which are more certainly attained by the remedies I have advised for the treatment of rheumatism, than by any other. Rheumatism in females being so frequently connected with suppression, or irregularity, or difficulty, or the cessation of the catamenia, or with leucorrhœal

affections, due attention in the treatment should therefore be devoted to these disorders.

163. *F. Gonorrhæal Rheumatism*, or the states of rheumatism consequent upon gonorrhœa (§ 44. *et seq.*), is one of the most difficult to remove. A severe case of it occurred in my practice very lately, and presented the mixed form of capsular and aponeurotic rheumatism, the knees, and limbs generally, having been severely affected. The iodide of potassium and solution of potash, in the decoction of bark, or in the guaiacum mixture, and frequently with colchicum, were the medicines chiefly prescribed. The case proceeded favourably, and after a few weeks the patient was able to have change of air, and to take regular walking exercise. In more obstinate cases, I have given the spirit of turpentine internally until the urinary organs were affected with success; or bark with alkalies and the iodide of potassium, whilst terebinthinate epithems, or blisters, were applied on or near to the affected joints. In this form of the disease, a full dose of calomel, colchicum, and opium, taken at night, and a draught with castor oil and spirit of turpentine the following morning, in addition to these means, and repeated at intervals of one, two, or three days, will generally be of great service. I have seen the tinctura lyttæ, and capsicum, given with the medicines now mentioned, until some degree of irritation was produced in the urinary organs by the former, and until heat or smarting at the anus followed the latter, prove most beneficial in this form of the complaint. If the affection of the joints become chronic, the internal use of the iodides, and the repeated application of blisters, or the formation of issues near the joints, and recourse to thermal springs, are amongst the most efficacious means of cure. If this form of the disease be neglected at an early stage and becomes chronic, it is not only removed with the greatest difficulty, but organic lesion of the joint is very apt to supervene.

164. *G. Rheumatism is often associated with influenza or catarrhal fever, or with ague, or with a remittent form of fever*, and I have already shown that the complication is due chiefly to the presence of malaria in the humid and cold air to which the patient has been exposed, or to his having previously been the subject of ague (§ 58.). In cases of either of these associations, the treatment which I have recommended for the rheumatic affection is equally appropriate to the associated disorder, the lowering means too frequently prescribed for the former aggravating not only it, but also the complication, and favouring the supervention of still more serious internal disease, especially of the fibro-serous, or serous surfaces.

165. *H. If Pneumonia or pleuro-pneumonia supervene in the course of acute rheumatism*, a moderate general or local vascular depletion will be prescribed with advantage, if the patient be strong or plethoric; and calomel or antimonials with opium, and saline diaphoretics, will generally be required. Blisters will also be of service. In a case, which was under my care, caused by removal in an unfavourable state of weather and season, into a damp house, rheumatism, in a sub-acute form, disappeared from the arm after two doses of the wine of colchicum of ten drops each had been taken, and was immediately followed by asthenic pneumonia with rusty expectoration. A

small cupping on the chest (seven ounces), and camphor with ammonia, small doses of the decoction of senega and terebinthinate rubefacients, and due attention to the several secretions and excretions, especially to those from the skin and kidneys, were soon followed by recovery. Pneumonia and pleuro-pneumonia associated with, or consequent upon rheumatism, have but rarely come under my observation; and the association of scurvy with rheumatism is not more frequent, although these complications appear to have been of more common occurrence during the early part of the last century, according to the best practical writers on medicine in that period. More recently *lemon-juice*, which has been found so beneficial for the prevention and cure of scurvy, has been said to have been serviceable in rheumatism, but I have had no experience of it in this latter complaint.

166. vii. *REGIMEN, DIET, AND CHANGE OF AIR.* — There are few diseases which require greater attention to these than rheumatism. During an attack of the acute form of the disease, the *regimen* and *diet* should be antiphlogistic. Such articles as are the least likely to occasion acidity should alone be taken. Saccharine substances ought to be avoided. As soon as convalescence has proceeded sufficiently far to admit of removal, *change of air* should be recommended,—more particularly to a mild or warm and dry air, or to a place where warm salt-water baths may be procured, or thermal springs may be used, especially to Bath or Buxton. If the attack has not been complicated with, or followed by, any affection of the heart, regular and active exercise in the open air ought to be taken, as soon as the patient is able, so as to preserve a free excretion from the skin. If any cardiac affection is present, an issue should be kept freely discharging near the margins of the ribs. In more chronic or mild cases, the regimen and diet ought to be regulated according to the peculiarities of individual cases; but, in every instance, change of air, active exercise in the open air, when it can be taken without detriment to the affected part; flannel clothing nearest to the skin; a diet regulated conformably with the state of the complaint; and due regulation and promotion of the several secretions and excretions, are most important aids to a permanent recovery, and to the prevention of a future attack.

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RICKETS. — *SYNON.* — *Rhachitis* (from $\rho\alpha\chi\iota\varsigma$, the spine, or $\rho\alpha\chi\iota\tau\eta\varsigma$, spinal), Glisson; — *Rachitis*, Sauvages, Vogel, Boerhaave, Cullen; — *Tubes Pituitosa*, *Morbus Anglicus*, *Osteomalacia*, *Mollities ossium*, *Osteosarcosis*, Auct.; — *Innutritio ossium*, Darwin; — *Osteomalakia*, Swediaur; — *Scrofula rhachitis*, Young; — *Cyrtosis rhachia*, Good; — *Tubes pectoræa*, *Spina nodosa*, *Rachitismus*; — *Rachite*, *Rachitisme*, Riquets, Fr.; — *Englische krankheit*, Germ.; — *Rachitide*, Ital.; — *Rickets*, softening of the bones.

CLASSIF. — *Class 3d.* Cachectic diseases; — *Order 2d.* Swellings (Cullen). — *Class 5th.* Diseases of the Excrent Function. — *Order 1st.* Affecting the Parenchyma (Good). IV. CLASS. IV. ORDER. (*Author.*)

1. DEFIN. — Softening and curvature especially of the long bones, and swelling of their extremities; the head being large, the spine bent, the abdomen enlarged, and the flesh emaciated and flabby, with all the signs of general debility and impaired assimilation.

2. This disease was first described by Dr. DAVID WHISTLER, in his inaugural dissertation (*De Morbo Puerili Anglorum dicto "the Rickets."* Lugdun. Batav. 1645.) GLISSON, who soon afterwards wrote on this complaint, states that he was induced to give it the name of *Rhachitis*, because the spine was so often affected in its course, and because the term nearly resembled *rickets*, the name by which it was commonly known in England before the time at which he wrote. Dr. CUMMIN remarks that the works of WHISTLER, GLISSON, BATE, and others, procured a currency for their opinion that the disease made its first appearance in the western parts of England towards the middle of the seventeenth century, and that it hence was called the *English malady*. The

first of these writers published in 1645; the second edition of GLISSON's treatise appeared in 1650; and hence it may be inferred that the complaint had first appeared at a much earlier period. FLOYER, indeed, states that "*Rickets* first appeared in England about the year 1620." These, as well as other contemporary writers, contend that the disease was considered of recent date; that it first appeared in the southern and western parts of the island, and that it had spread to the eastern and northern counties by the time when GLISSON wrote. Softening of the bones, although most frequently observed in the young of the human species, is not confined to the species; for it has been observed in monkeys, in the several domestic animals, in the ox, the horse, and in pigs; and even in poultry, especially when exposed to cold, humidity, unwholesome air, and to improper diet. Viewing rickets as consisting chiefly of an imperfect assimilation, in which the bones suffer more especially, and evince more or less softening, I shall first and chiefly consider it as it appears in *children* — as common or true rickets; and next, very briefly as it occurs in *adults*, or as the *mollities ossium* of writers.

3. I. RICKETS AS AFFECTING INFANTS AND CHILDREN. — Rickets has been observed in the foetus by several writers; but it is doubtful whether or not the imperfect ossification, and consequently softened state of the bones, observed congenitally, should be viewed as rickets, as, in this disease, there is, as will be shown hereafter, a change in the state of the affected bones different from a mere delay or simple imperfection of osseous formation. The complaint has been met with from the earliest months until approaching puberty; but it is most commonly observed to commence during the first dentition, or from six or seven months to three years of age. M. GUERIN states that, of 346 cases, 209 were affected from the age of one to three years. Three cases only were congenital, and 34 only occurred from four to twelve years. Of the 346 cases, 148 were males, and 198 females.

4. i. DESCRIPTION. — The course of the disease has been divided by MM. GUÉRIN and GUERSENT into *three stages*, 1st, that of incubation; 2d, that of deformity; and 3d, that of restoration or of irremediable atrophy, as the termination may be. From considerable experience of the complaint, I believe the division to be useful, and to be based on sound observation. — *A.* The *precursory*, or *incubative* period, does not constitute the complaint; but consists chiefly of that impaired state of the organic nervous or vital functions which occasions those changes constituting the malady; and that state may be associated with a variety of ailments of the digestive and assimilating organs. The transition from apparent health to the incipient state of the disease is always gradual, and consequently more or less slow; but it may be masked by some other disorder, and hence not be recognised until this period has made considerable progress. The impairment of vital power originating the malady is most frequently associated with indigestion, or with chronic irritation of the gastro-intestinal mucous surface, or with bronchitis, or with hooping-cough, or even with lobular pneumonia, and with more or less change of the urine, which, however, has generally been imperfectly examined. Nevertheless, cases

occur in which but little or no ailment, or merely slight debility of the digestive and assimilating functions, has been remarked up to the time of the manifest appearance of the complaint.

5. With the approach of rickets, the child is dull, or sad, or peevish; is averse from play or any action; prefers to sit or lie, appears feeble or indolent, or complains of inability to use exertion, and of pains in the joints and along the bones; the appetite is impaired or is capricious; the bowels are irregular or relaxed, and the stools morbid, or pale, or deficient in healthy bile; the face is pale, and the flesh becomes soft and flabby; perspiration is free on slight exertion, and is weakening and colliquative during sleep, and the skin often moist during the day. The pulse is quick, soft and broad or open, the external veins are large, and the jugular veins much dilated. Thirst is generally present; emaciation becomes evident, and the abdomen tumid. With all these symptoms, however, no evidence of rickets may exist; for they may accompany or usher in other maladies; but, when with these, the urine is more abundant than in health, and when it deposits a copious calcareous sediment, or abounds in the phosphates, then the early or precursory stage of the complaint may be considered as already present; and it is in this stage especially that the salts are most abundant in the urine (§ 16.).

6. The *duration* of this period necessarily varies with the number and severity of the symptoms now enumerated, with the age and constitution of the patient, and more particularly with the quantity of phosphates contained in the urine. It may thus vary from one or two months to six or seven; but, when the head is very large, and the bones of the head imperfectly developed, or the sutures not closed when the abdomen is very tumid, the bowels lax, the stools pale and deficient in bile, and the urine abundant, the second, or developed state of the complaint appears early. The continued operation of the causes, neglect or injudicious treatment, and the occurrence of some local intercurrent affection, may shorten this period; whilst a proper treatment and regimen may remove all the symptoms, and prevent the development of the disease. In some cases, also, the precursory stage may be hardly apparent; the first indication of the complaint being the actual deformity of the limbs constituting the second stage; the child may have appeared, up to the detection of the flexure of the long bones, in good health; although closer observation and an examination of the urine would have detected more or less evidence of disorder.

7. *B. The second period* is that which is characterised by more or less deformity of the bones. The extremities of the long bones, especially those of the ankles and wrists, and the sternal ends of the ribs, are the parts which first evince this stage, by their swollen or knobby appearance; and the lower portions of these bones now begin to yield, especially those of the lower limbs, when the child is so old as to attempt to walk. The increasing softness and yielding of the bones are now apparent in the gradual change of their forms. The lower extremities are usually curved by the weight of the body, whilst their bones yield more or less to the action of the most powerful of the muscles. They generally present the convexity of the cur-

vature outwards, and the concavity inwards. The femurs are sometimes curved forwards, but more frequently outwards, as are the tibiae. The knees are sometimes bent inwards, and the feet thrown outwards, so that the knees press against each other, and the patient rests on the inside of the foot; and as often the knees are separated to an unnatural distance by the continued curvature outwards of both the thighs and legs, the whole of the lower extremities forming irregular curvatures, with the convexities outwards and greatest at or near the knees. In some cases the angle formed between the neck and shaft of the femur is changed from an obtuse to a right or an acute angle. Much of the deformity which takes place in this stage is owing either to the manner of carrying or placing the child, or to the weight of the body and head upon the lower extremities when attempts are made to stand or walk, and upon the upper extremities also, when the child crawls about on its knees and hands.

8. The head of the rickety child is generally unusually large. The vertex is often flattened; the forehead is prominent and broad; and the centres of the parietal bones expanded. The fontanelle is wide and unclosed; and, if the child be very young, the sutures expand or remain open. The bones of the face are imperfectly developed, or are partially arrested in their growth; and the under-jaw is often elongated. The process of dentition is arrested or delayed; or if they have been formed they soon decay, owing to softening of the fangs, and of the alveolar processes. The clavicles are, after the bones of the lower extremities, the most frequently deformed. The long bones of the upper extremities are much less frequently curved than those of the lower. The spine is generally also curved, owing as much to yielding of the ligaments as to softening of the bodies of the vertebræ. The curvature is commonly outwards, but it is sometimes also lateral-outwards in the back or between the shoulders, where the curvature is also to one side, and to the opposite side in the lumbar region, where also there is sometimes a curvature inwards. The curvatures of the spine, especially outwards, are generally connected with a flattening of the ribs laterally. The ribs are turned inwards, and their sternal extremities, at their connections with their cartilages, are swollen into knobs. Whilst the sides of the chest are thus compressed, the dorsal spine is pushed outwards, and the sternum also outwards, the diameter of the chest, from right to left, being thus much diminished, and the "pigeon breast" formed. (See art. *CHEST, deformities of.*) The flat bones, as those of the shoulder and pelvis, are also sometimes affected. The shoulder-blade is, in a few instances, so deformed as to embarrass more or less the movements of the shoulder; but when the bones of the pelvis are softened, the deformity is of the utmost importance, especially to the female, in after life. The change of form in the pelvis is often remarkable, and is extremely various, the sacrum and pubis being carried either backwards or forwards, the ilia directed inwards or otherwise altered, the lower part of the sacrum pushed upwards, and the outlet of the pelvis variously altered in form and diminished in diameter. The progress of deformity is generally from the extremities to the centre of the frame, and more

especially from below upwards, particularly after the first year.

9. The relative proportion of the alteration of the different bones in rickety patients has been stated by M. GUÉRIN. But it should not be overlooked that, as the bones nearest the centre of the frame are the last affected, or are liable to deformity only at an advanced stage, and in neglected or ill-treated cases, the statistics he has furnished are open to the objections which may be urged against the statistics of other diseases — whether the relative proportion, or numerical calculations, be applied to symptoms, or to organic changes, or to remedial results,—objections based on the differences of disease owing to varying combinations of predisposing and exciting causes; to endemic and epidemic influences; to seasons and weather, to modes and manners of life, and to numerous circumstances, to which it is needless here to advert. M. GUÉRIN states that, of 496 cases of rickets, eleven only had swellings of the extremities of the bones without curvature; and of the 485 with curvatures, 59 had at the same time deformity of the thorax, 48 deformity of the spine, 17 enlargement at the same time of the cranium, and 14 only deformity of the upper extremities simultaneously with these alterations.

10. During this stage, the deformity of the bones is not the only change. The alterations mentioned in connection with the first stage continue during this. The abdomen continues tumid, or increases in size, and is more tympanitic, the limbs more emaciated and flabby; the child more languid and weak; the perspiration free and readily increased; the thirst increased; the pulse quick, small, and weak, with slight hectic symptoms; and pains are complained of in the bones and joints. The bowels are irregular, or loose, and the stools pale or almost devoid of healthy bile. The general emaciation and change in the bones allow the head to appear larger than usual, whilst it is often only large in proportion to the rest of the body; and whilst all other parts of the frame, the bones especially, cease to grow, during this stage, the head appears even to enlarge, and the faculties of the brain to be developed, sometimes precociously.* The cessation of growth, particularly of the bones, during this period is most remarkable in the lower extremities, and less so from below upwards. M. GUÉRIN states, that his comparisons of the skeletons of rickety subjects, with those of the same age and sex who had not been rickety, gave the following per centage of reduction in the different bones: — in the fibula, 28 per cent.; in the tibia, 25; in the femur, 22; in the cubitus, 19; in the humerus, 15; in the

clavicle, 9; in the sternum, 8; in the spine, 5; and in the pelvis, 17 per cent.

11. The *duration* of this stage necessarily varies with the persistence or removal of the causes during treatment, with an early or delayed recourse to judicious means, with the diet and regimen, and with the local affections which may complicate the disease. In the more rapid states of the complaint this stage may not continue longer than two or three months, whilst in more chronic forms, and when the complaint has been long neglected, and unfavourable circumstances continue their influences, this period may extend even to several years, the deformity and its attendant symptoms either very slowly increasing or remaining nearly stationary.

12. *C.* The *third stage*, or *period of restoration*, or that attended by either a favourable or unfavourable change, is marked by no very sudden alteration from the state above described; it appears gradually, but rarely rapidly, unless some intercurrent disease, or local affection supervene; and this is not infrequent. — (a.) If the disease does *not tend towards recovery*, the emaciation increases, the abdomen is more distended, and the bowels more disordered, whilst the secretions and excretions are still more morbid than before. The deformity of the bones continue or increase; and ultimately the child is carried off by disease of the lungs or of the abdominal viscera, or several lesions of the thoracic and abdominal organs may co-exist in the same case and terminate life, as congestion of the lungs with effusion into the pleura; general bronchitis with gastro-intestinal irritation; lesions in the digestive canal with enlargement of the mesenteric glands; crude tubercular formations in the lungs, with tubercles in the membranes of the brain, and effusion in the ventricles or between the membranes, &c. If the child is not carried off by one or more of these, and continues deformed, without any amendment of the symptoms, the softness of the bones is much diminished, their flexibility is lost, they are more atrophied, and they are more readily broken; the deformity often still increasing. Recovery then rarely takes place; a complication of internal disorders, consequent upon structural changes, and upon a morbid state of the blood, ultimately terminating life.

13. (b.) A *favourable change* from the second stage is evinced at first by the states of the secretions and excretions. The urine assumes a more natural appearance and composition (§ 16.); the stools are more healthy, and coloured more deeply by bile; the abdomen appears less tumid and less tympanitic; the pulse is less frequent, and pains in the limbs are not so much complained of. The countenance presents more animation; and the hectic or remittent febrile symptoms and thirst subside gradually. The appetite is less capricious and more natural; and, with the continuance of these changes, the flesh becomes firmer, and voluntary motion is made with greater activity. The growth of the limbs, which had been suspended until now, proceeds with remarkable vigour; the bones are gradually restored, and, if the deformity is not very great, it disappears by degrees; the curvatures are either diminished or altogether removed; the swellings of the epiphyses of the bones subside, and ossification proceeds with great rapidity, the affected bones ac-

* Mental precocity is not, however, always seen; for sometimes the child continues dull, taciturn, or stupid, or even idiotic. These opposite states have been explained by supposing that the openness of the sutures has allowed the circulation and developement of the brain to advance at an increased rate, and the faculties of the mind to expand; whilst the closure of the sutures, and the consequent unyielding state of the cranial bones, have confined and embarrassed the functions of the brain, and occasioned the opposite state of the mental powers. But, as far as I have observed, precocity has not always existed in connection with openness of the sutures; nor stupidity with their closure. Perhaps the chemical pathologists, who attempt to explain all by chemical changes, will account for the different phenomena by ascribing them to the state of the blood and to the excess of phosphates in it, during their passage from the bones to the kidneys, by which they are eliminated.

quiring greater density and strength than usual. The muscles also acquire a more powerful development, so that persons who have been rickety in childhood have afterwards become remarkable for strength.

14. (c.) During *recovery* an excessive ossific action often occurs, more especially in the parts which had been swollen and softened during the stage of deformity. Not only are the sound bones more dense, but, in some instances, a state of hyperostosis or extoses more or less numerous, especially near the epiphyses and sutures, is observed. I have seen this occur most remarkably at the terminations of the ribs and commencement of the cartilages, the whole being more or less soldered together, and also with the sternum. Occasionally slight accessions of fever are observed during recovery, and either advance the process of restoration, or are the mere concomitants of the change taking place in the bones and system generally. If the complaint occur in children about the second year of age, or later, although it may be of considerable duration, amendment is generally rapid when it commences; and even when the growth is stunted, and the deformity is still considerable, still the period of puberty may remarkably develop growth and diminish the deformity, especially when the advantages of a favourable change of air and out-doors exercise are enjoyed.

15. When the disease is attended by an outwards or lateral curvature of the *spine*, or with flattening of the ribs and protuberance of the sternum (see art. CHEST, *deformities of*), recovery is imperfect and protracted, and the more so the greater the deformity arising from the curvatures of the spine and the flattening or bending inwards of the ribs. In these cases the functions of the lungs are impaired, and the more advanced parts of the assimilative processes are impeded. In many of these cases, especially in those which are the most deformed, and when the spinal curvature is so extreme as to form a dorsal hump, the deformity continues through life, the duration of which it may considerably abridge, by favouring the supervention of congestion of the lungs, or bronchitis or pneumonia, or even asphyxia, by pressure on the origins of the spinal nerves. In some, the curvature diminishes with the restoration of health, aided by suitable treatment and regimen; but, in others, it increases, sometimes after having been long stationary, owing to some change in the general health, or to debility, or to disease, when ultimately a fatal termination takes place in the way now stated.

16. D. *The urine in rhachitis* presents more or less change from the healthy state. Generally it is much more abundant than might be expected, considering the free transpiration from the skin. It is commonly pale, but it is sometimes of natural colour. The urea, and uric acid are diminished, whilst the salts are increased. A free acid is sometimes observed, which has been said to be the phosphoric, but this requires further investigation. The phosphates are more abundant than in health, and more especially than in healthy children; and a considerable sediment of oxalate of lime is not infrequent; and it has been observed that urinary calculi are frequent in rhachitic children. As far as my own observation enables me to state, the increase in the fixed salts is most

considerable during the advance of the first stage, and when the deformity begins to appear in the bones: it is less remarkable when the disease is far advanced, and the softening and flexures the greatest. The phosphate of soda and the earthy phosphates are most abundant. In a case examined by MARCHAND (*Lehrb. der Phys. Chemic.* p. 338.), the urine contained much lactic acid and lactates, and a great excess of the earthy phosphates. In a case by Mr. SOLLY (*Transact. of Roy. Med. and Chirurg. Soc. &c.*, vol. xx. p. 448.), three or four times the usual amount of phosphate of lime existed in the urine. The exact composition of the urine during the third stage, especially during a return to the healthy state, has not been shown.

17. E. *Various complications* often occur in the course of this complaint. These may be either of an acute or chronic nature. Rickety children may be the subjects of the usual disease of childhood, as hooping-cough, measles, scarlet fever, small-pox, &c., or of bronchitis, pneumonia, inflammatory irritation of the digestive canal, enlargement of the spleen, scrofulous enlargement of the glands, tubercular productions in the lungs and other organs, cutaneous eruptions, &c. Most of these are accidents by no means necessarily consequent upon the rickety constitution; but, when the disease is far advanced, or is attended by deformity of the spine or chest, then the affections of the lungs, pulmonary congestion, effusions into the shut cavities, and disorders of the digestive organs, may be favoured by such deformity. The complications now mentioned, which are not specific, and which result not from infection, are often produced by certain of the causes which combine to produce this malady, or by influences to which children in this state are often exposed, more especially to various endemic influences, as a close, cold, and humid air, and injudicious diet. M. GUERSENT remarks, that he has seldom found rickety children the subjects of tubercles, although he has observed two-thirds of children who have died of other diseases present tubercular formations in some of their organs. M. RUIZ also states, that in twenty rickety subjects he found tubercles only in six. There can be no doubt of these complications having the effect of aggravating and accelerating the unfavourable progress of the disease in most cases; the only exceptions being when the eruptive fevers occur in a mild form, and then, in a few cases, they have appeared to impart a new and favourable state of vascular action to the frame. In the most severe and advanced cases, other complications than those already mentioned often occur, and, in the weakened state of constitution, frequently terminate life. These are chiefly colliquative diarrhœa; hectic with colliquative sweats; congestion of the brain, with or without effusion, and attended either by coma or convulsions, fractures of the long bones on sudden motion, retension of urine, complete or incomplete palsy chiefly in the form of paraplegia, and loss of one or more of the functions of sense.

18. F. *The appearances after death* possess interest, not merely as respects the state of the internal organs and the lesions in them to which death is more directly owing, but as regards the changes observed in the bones themselves. These latter changes can be observed in the early periods of the disease, only when the patient is carried off

by some complication, or intercurrent disease. M. GUÉRIN has observed the alterations which take place in the bones during the three periods of the disease, and from his researches I am enabled to give the following account: — (a.) When death is caused by some acute disease affecting a rickety subject during the *first stage*, as sometimes happens, the long bones, when quite fresh and not previously exposed to the air, are congested with a large quantity of dark blood, which exudes from all parts when the bone is divided either longitudinally or transversely. This blood appears not to be contained in blood-vessels, but to be effused on each side, in the medullary canal between the medullary membrane and bone, in all the areolæ of the spongy structure of the diaphyses, of the epiphyses, and in the intermediate tissue which unites these two portions of bone, and under the periosteum, which is evidently injected and thickened. Blood is also interposed between the lamellæ of the compact structure of the bones, these admitting of an easy separation, and allowing this fluid to exude in numerous minute points. The blood is at first very fluid, and is readily removed from the surfaces on which it exudes; but, at a more advanced stage, it loses its dark colour, becomes gelatinous and semi-transparent, and adheres firmly to the surface of the osseous tissue. It then presents the rudiments of minute capillary vessels. During these changes in the blood the vessels of the bones acquire an increased development; the openings through which the vessels pass to and from the interiors of the bones are much dilated, and the osseous system is the seat of a remarkable sanguineous congestion, in which the small and flat bones also participate more or less.

19. (b.) In the *second stage*, the osseous tissue is manifestly more or less softened, admitting of flexures according as the weight, pressure, position, or muscular actions of the body may direct them. On examining closely the structure of the long bones, the swellings of the diaphyses and epiphyses are found to be owing to the development of a very fine spongy tissue, of a new formation, which M. GUÉRIN has named the "*spongoid tissue*," to distinguish it from the ordinary spongy structure. This tissue consists of very fine irregular areolæ, which replaces the sanguinolent fluid charging the bones in the first stage, and is found spread out underneath the periosteum, forming a coat from one to two lines in thickness. It is found also between the lamellæ of the bones, where it may be detected by its darker colour; and between the bone and the medullary membrane; but it is abundant around the epiphyses. It is also abundant, and more dense at the concavities of the flexures than at the convexities; and it is found in both the long and flat bones. The periosteum is more or less vascular and thickened.

20. (c.) The *third stage* presents changes in the bones very different from each other, according to the termination it assumes. When recovery and consequent re-ossification take place, the *spongoid tissue* of the new formation is nearly altogether transformed into a compact structure, especially in the concavity of the curvatures; and it is so abundant towards that part where the medullary canal is most contracted, as to invade the greater part of the canal by osseous lamellæ. Whilst the compact structure acquires a very great density,

it becomes the whiter the longer the duration of the consolidation, until it assumes the hardness and appearance of ivory. Disseminated through this structure in the diaphyses, and in the epiphyses as well, irregular open spaces are sometimes observed, apparently resulting from a partial resorption or from a retraction of the solid parts. When re-ossification does not take place, the compact structure is thin, fragile, dry, or compressible, especially around the epiphyses. The areolar tissue found within this thin osseous shell consists of large unequal or irregular cells, which extend throughout the whole of the medullary canal, which is filled with very fine osseous lamellæ surrounded by an oleaginous fluid. This alteration, which is found also in the epiphyses, M. GUÉRIN has named "*Rickety consumption of the bones*."

21. (d.) It must be evident from these alterations that the bones will present important chemical results upon analysis; and that the chemical changes will vary with the amount of softening, and of the alterations just described; and as these latter vary in different cases, in the same case at different periods, and in different bones in the same subject. According to BOSTOCK and BECQUEREL, the earthy constituents of the bones are remarkably diminished during the early stages of the complaint. In two children who died of pneumonia during the early period of rickets, the bones of the cranium presented but a slight diminution of the earthy phosphates, whilst the femur, the tibia, and the sternum, contained only from a fourth to a twelfth part of the proportion usually observed in health.

22. (e.) The complications of the disease above enumerated, will suggest many of the visceral lesions observed in fatal cases of rickets; for to these death is generally more immediately owing. The brain is found more or less large relatively to the rest of the body; and fluid is often effused within the ventricles and between the membranes, which in a few cases have presented small or crude tubercular formations. Effusion of serous fluid is sometimes found in the pleural cavities; and the lungs often are pushed downwards by the lateral pressure of the ribs. The bronchi are often inflamed or congested, the lungs are congested, or in parts resemble the structure of the spleen, or contain, in some instances, tubercles in various stages of development. The heart is often paler than natural, and, in a few instances, has presented incipient organic lesions, especially when the complaint has been of long duration, and the deformity of the chest has been considerable. The liver and spleen are often pressed downwards by the thoracic deformity; and both organs are sometimes found more or less enlarged—the liver frequently paler than natural. The alimentary canal is generally very much distended by flatus, and the mesenteric glands are more or less enlarged, and occasionally contain crude tubercles. The different series of glands contained in the digestive villous surface are either enlarged or ulcerated, particularly when the disease has been complicated with intestinal disorder. The muscles are generally very flabby, pale, and wasted; the adipose tissue is wasted by absorption; and what remains appears soft and almost fluid. The whole of the structures, visceral and external, present a state of flabbiness or softness.

23. ii. DIAGNOSIS AND PROGNOSIS. — A. The

Diagnosis of this complaint is sufficiently easy, excepting in the precursory stage; and then it is often as difficult as it is important to detect the approaching mischief. In this stage the complaint may be mistaken for several incipient diseases, especially for tubercles in the lungs, for tubercular peritonitis, for tubercular disease of the brain or of the cerebral membranes, or of the spine. A short time and an attentive observation of the symptoms, will soon show whether or not they agree with those described as characterising the first stage (§§ 4, *et seq.*); and when enlargement of the ends of the long bones, and especially when these become at all deformed, the diagnosis will be manifest. If any mistake should be made, or any difficulty of diagnosis between the incipient states of these maladies should arise, but little evil need result, as the treatment would not be inappropriate to either of them. It is evident from the changes observed in the bones, especially those evincing reossification, that the softening of the bones of children, or *true rickets*, is, in very essential points, a distinct disease from the *softening of the bones* sometimes observed in adults, especially in females, although I have considered it at this place as a species of rickets, from the softening and deformity attending it. This latter, the true osteomalacia, or mollities ossium, is never followed by reossification, especially when it is consequent upon chronic or malignant diseases, or the puerperal state. Curvatures of the spine supervening in the course of rickets, should not be confounded with those curvatures caused by tubercular or scrofulous disease of the vertebræ on the one hand, or by relaxation of the ligaments, &c. on the other. (See Art. SPINE). Nor should it be overlooked, that the curvatures of the spine, so frequently observed connected with deformity of the chest, may exist in children as well as in adults, or young persons about the age of puberty, without the least degree of rickety change in the bones; that this curvature, as well as the deformity of the chest and sternum (described in article CHEST, *deformities of*), may exist, on the one hand, either separately or together, both in children and in adults, no other deformity of the bones being present; that either or both deformities may, on the other hand, supervene in the progress of true rickets, and of mollities ossium, or the rickets of adults; and that, when curvatures of the spine are thus associated with true rickets, or with mollities ossium, the bones of the pelvis are generally also deformed or contracted in various directions, more especially when the lower extremities continue much bent and shortened by true rickets, and when the softening occurs in adult age. It is worth noticing, also, that the extremities, especially the lower, not only cease to grow during the disease, but also continue much shorter during life, although they have acquired remarkable strength.

24. *B.* The *prognosis* depends not only upon the progress and severity of the complaint, but also upon the combination, or persistence of the causes, and upon the effects produced by treatment. If the child be not remarkably debilitated, if the disease be not far advanced, and if the deformity have not invaded the spine, or pelvis, or parietes of the chest, a favourable result may be expected from treatment; but when vital power is much reduced, when the deformity is great, and has

extended to the spine, or to the chest, or to the pelvic bones; still more especially when it is complicated with serious visceral disease or lesion, and when the deformity is such as to impede the respiratory functions, or when the head is affected, and sopor, coma, or convulsions supervene, or when the urinary functions are disordered, then complete recovery should not be expected; and, although life may in many cases be indefinitely prolonged, yet it may be very rapidly terminated, particularly in the latter circumstances. An unfavourable issue is the more likely to occur the earlier in infancy the complaint appears, the more serious the disorders which usher it in, and the more manifest and marked the predisposing causes existing in the parents.

25. *iii. CAUSES.*—A due recognition of the remote causes of rickets is of the utmost importance in preventing and in curing the disease.—*A.* The *predisposing causes* are not merely those which act externally on the child, but those also, and often especially, which are derived from the parents and the nurse—these latter sources, which have been too much overlooked at the present day, but to which BOERHAAVE and his commentator have directed attention.—“*Maxime autem infestus habetur proli, cujus parentes laxa et debili conditione corporis, otiosi, molles, opipara mensa, cibis pinguibus, saccharatis, pauca pane, vinis dulcissimis, et aqua multa calida, usi, morbis chronicis, venere, ætate, exhausti, tabi inprimis venereæ, et iteratis gonorrhœis, multum obnoxii, effœtam ferme genituram impenderunt generandis liberis.*” (§ 1482).—There is much truth in this enumeration of the predisposing causes derived from the parents. In respect of the influence to be ascribed to the exhaustion produced in the parents by chronic diseases, venereal excesses, and age, VAN SWIETEN remarks:—“*Tales parentes, debiles, morbosos, languidos, infantes gignere, nemo dubitat. Unde inter signa sanitatis optimæ numeratur, si quis natus sit parentibus sanis, vegetis, plenæ ætatis, rara sed fervida venere utentibus. Lycurgus qui validis exercitiis firmabat virginum corpora, antequam viris jungerentur, voluit, ut recens nupti non cohabitarent, sed clam et furtiva quasi venere uterentur tantum, adeoque rara et fervida. Talem curam gessit robustæ et bellicosæ posteritatis. Facile patet, qualis proles expectanda sit a decrepitis, uti et ab illis, qui, in ipso ætatis vigore, libidine ac perditissimo vivendi genere exhausti, conjugia ambiunt, dum, ante trigesimum annum jam imbelles senes, lectissimas virgines turpiter decipiunt.*” (Vol. v. p. 587.).

26. There can be no doubt that these causes, so strongly insisted upon by BOERHAAVE and VAN SWIETEN, predispose to this disease in the offspring, by imparting an innate or congenital debility to the infant constitution, although they cannot be viewed as imparting a more especial tendency to it than to scrofula, or to other diseases of debility to which this is more or less closely allied. The children of parents who have married at a premature age, or who have indulged in sexual excesses, or who have been guilty of self-pollution, or who have become debilitated by other causes of exhaustion, as by living in unhealthy localities, or in the foul air of crowded factories, or by sleeping in close or crowded sleeping chambers, are predisposed to this, amongst other maladies, which are allied more or less to each other,

as respects their causes, rather than as regards their forms or seats. Certain of the predisposing causes existing in the parents, to which BOERHAAVE imputed a considerable influence, and which probably did, at the time he wrote, and still more so when rickets first became a frequent disease, possess this influence, namely, the taint or constitutional debility consequent upon venereal or gonorrhœal affections, may not, in the present day, produce this effect upon the offspring in so remarkable a manner as in those times; still I am convinced that they are not without some effect, although I believe that they are more influential in developing a scrofulous diathesis than in predisposing to rickets.

27. The effect of *leucorrhœa* upon the offspring, more particularly as predisposing to rickets, may admit also of doubt; still some of the best medical authorities have insisted upon the influence of this complaint in the parent. STÖRCK contends that females who are subject to *leucorrhœa*, are liable to suffer abortion, or to have rickety children. — “*Monebat, tales mulieres, nisi integre curentur antequam nubant, facile abortiri, si conceperint. Dum felici arte cavebatur abortus ita, ut foetus ad maturitatem perveniret, notavit sequentia. Tales autem feminae pariunt plerumque infantes crassos, pingues, robustos, et hi tales manent per plures menses: postea vero emaciuntur, lassi fiunt et membra pendula gerunt; tandem subsequitur pessima rachitis, quæ raro huc usque sanari potuit.*”

28. The predispositions referable to the children themselves have not been sufficiently investigated. Rickets have been observed in all constitutions: in the dark, the fair, the delicate, and the apparently robust; but most frequently in the delicate, in the sickly, in the soft and flabby, and in infants with large heads, whose fontanelles remain open, and whose dentition is delayed. Insufficient nourishment, unhealthy milk, early weaning, or “bringing up by hand,” a watery farinaceous diet after weaning, a too exclusive use of vegetables, and the want of animal diet in cold and damp localities, and the periods of the first and second dentition, favour the occurrence of the complaint, especially in the constitutionally or hereditarily predisposed. Indeed whatever debilitates the frame not only predisposes to rickets, but also sometimes more directly develops it.

29. *B.* No particular exciting cause can be adduced in some cases to account for the appearance of the disease, besides those which I have enumerated as being occasionally predisposing influences. But when these act in combination, and when other fortuitous circumstances aid their operation, they produce a more direct and exciting effect. Probably, however, residence in a cold and damp locality has a still more direct influence in developing rickets, even than those causes already mentioned, although without their aid this cause may not produce this effect. Indeed the disease is even endemic in those places which are cold and damp, and where the poor are insufficiently fed and clothed. I believe that the abuse of spirituous liquors by either parent is not only a predisposing, but also an exciting cause of the complaint, and that it is more especially such when the vice is indulged in by the mother during the period of lactation. The murderous practice of giving narcotics to infants, so notoriously prevalent amongst many of the physically and morally de-

graded of the manufacturing population, may produce a similar effect where it fails of causing a more rapid extinction of life.

30. *C.* The proximate cause of the change in the bones, of which rickets is the result, is still unascertained. No satisfactory explanation of the changes which take place in this part of the frame has hitherto been adduced. It has been suggested, that a superabundance of acid in the blood may cause the removal of the phosphates from the bones; but there has been no analysis of the blood in this disease, and the existence of an acid, and still less the kind of acid, in the blood have not been shown.* If the change were owing to the state of the blood entirely, it might be expected that the bones would undergo the same amount of softening and of chemical alteration throughout the frame. But this is found not to be the case, for the bones of the lower extremities experience these alterations in a much more marked degree and much earlier than those of the head or trunk. It may therefore be inferred, that whatever agency the blood may exert must be directed or influenced by the vital or the organic nervous influence, to which the nutrition of the several structures is chiefly to be imputed. We only know that the disease results from many depressing causes, acting in various combinations, but always producing a constitutional debility, depressed organic nervous energy, imperfect assimilation and nutrition, and consequently a morbid state of the blood, with all the consecutive changes observed first in the softer structures, and ultimately in the bones; but our knowledge has advanced no further than this, either in amount or in precision.

31. *iv.* TREATMENT.—*A.* The prophylactic treatment of rickets consists chiefly of the avoidance of the causes which occasion it, and of the adoption of those hygienic means which are requisite at all periods of early life, and more especially during the epochs of infancy and childhood. A healthy nurse, a warm and dry atmosphere, change of air, due ventilation, the animal warmth communicated by a healthy mother or nurse, suitable food—suitable as respects the periods of lactation, of weaning, and of dentition; attention to cleanliness, to dryness of the clothes, and to the warmth of the lower extremities, are the most efficacious measures, as far as concerns the child itself, that can be adopted for the prevention of this malady.

32. *B.* The treatment of the successive stages of the complaint depends much upon the visceral and constitutional disorders attending them. These disorders, especially when neglected or improperly treated in the first stage, tend to develop the rickets; and, in the second, either to retard recovery or to endanger the patient.—(*a.*) When any of the affections, which have been mentioned

* Although the existence of lactic acid in the blood has not been demonstrated, it may probably exist; for it is not unlikely that this acid is formed in excessive quantity in the digestive canal during the early stages of the disease, owing to the nature of the ingesta and the state of the primary assimilation, and that, being carried into the circulation, it there affects the functions of nutrition, and impairs organic nervous energy, although its accumulation in the blood, in a large or very sensible quantity, will be prevented by the depurative actions of the skin and kidneys. It may also be remarked, that the formation of lactic acid in the digestive canal, and its excessive excretion by the emunctories, are phenomena of familiar occurrence in rheumatism, in the puerperal state, and in several diseases, during which softening or other changes in the bones have sometimes taken place.

as complicating the *first stage*, appear in conjunction with those symptoms or indications of incipient rickets—more particularly with an excess of the phosphates in the urine, the treatment of them should be conducted with much caution; for they have been too frequently viewed and treated as inflammatory, when they have been only the results of irritation, or consequences of the presence of irritating materials circulating in the blood, and of an asthenic state of organic nervous power. When, therefore, any of the disorders noticed above (§ 17.) are observed to complicate this stage of the complaint, they should then be removed by means directed more especially to the improvement of the secretions and excretions, to the mitigation of both local and constitutional irritation, and to the promotion of vital power. In order that these intentions should be fulfilled with due success, the states of the perspiration, of the urine, and of the intestinal discharges should be carefully and almost daily examined. The urine particularly ought to be tested and chemically investigated; and, upon the states of these excretions, the choice of medicinal agents, as well as of diet and regimen, should mainly depend. The primary processes of assimilation especially require attention; and these are generally most efficiently promoted by a suitable diet, and by a warm and dry atmosphere.

33. When the *urine*, although abounding in phosphates, nevertheless presents an acid re-action, and when it does not become rapidly offensive, then alkalies may be given with tonics, sedatives, or alteratives. The irritative fever and quickness of the pulse, frequently attending the first stage of the disease, have often induced the physician to prescribe lowering means, when a restorative treatment was actually required. But the attendant fever being characterised by nervous asthenia, by copious or colliquative perspirations, by pale phosphatic urine, by general palor, and by the softness of the pulse, these furnish sufficient indications for restorative remedies. The alkalies most serviceable in these circumstances are, the carbonate of potash, the liquor potassæ, or BRANDISH's alkaline solution, or magnesia, with infusion or decoction of cinchona, or infusion of cascarrilla, with aromatics. If the carbonates be prescribed, small doses of the dilute hydrocyanic acid, or of the extract or tincture of conium, will be of use. If the urine present only a slightly acid re-action, or if it be already, or soon become alkaline, the mineral acids, especially the hydrochloric and the nitric, or the combination of both, may be given with aromatics, or with small doses of the hydrocyanic acid, or of opium, or of conium.

34. If the *bowels* be confined, they should be sufficiently opened, and all fæcal accumulations and morbid secretions evacuated by means of stomachic aperients, especially the compound decoction of aloes, or equal parts of the compound infusions of gentian and senna, or rhubarb with aromatics. When the stools are devoid of bile, it will be preferable to attempt to procure an increased secretion by means of the nitro-muriatic acids, given internally, or used externally at a warm or tepid temperature, than to administer mercurials, which tend to depress still further the already impaired organic nervous power. Occasionally, however, the hydrargyrum cum creta will be given with benefit in conjunction with

rhubarb, and cinnamon or ginger. If the patient be so old as to swallow a pill, these will be most advantageously combined with the inspissated or purified ox-gall. If the bowels be relaxed, or the stools yeasty, and the patient much griped, or pained generally, the alkaline medicines (§ 33.) may be given in lime-water and milk, with minute doses of tinctura opii, or of tinctura camphoræ composita, or of tinctura lupuli; and an enema, containing the same ingredients, may be occasionally administered. In these latter circumstances, liniments or embrocations containing either of the balsams or turpentine, or camphor, applied over the abdomen, are of essential service. The terebinthines and balsams are severally of use, when given internally, but they ought to be prescribed only occasionally, and in small doses, so as not to irritate the urinary organs. Emetics have been advised, but they are of service only when this stage is complicated with hooping-cough or bronchitis, and even then chiefly with the view of procuring a discharge of accumulated secretion from the bronchi, when there is difficulty in expectorating it. During this period, as well as in the second, when there are marked palor of the surface, and frequent sweats, the mistura ferri composita, made agreeable with liquorice powder, is eminently beneficial; and if any pulmonary symptom exist, conium should be added. If the bowels are torpid, this mixture may be conjoined with the decoctum aloes compositum.

35. In this stage, as well as in the next, sponging the back, loins, and thighs, with a tepid solution of bay-salt, or with tepid sea-water, is generally of service, especially when followed, or preceded by active friction of the surface. The complaint in this stage is often quickly arrested by change of air, especially to a warm and dry situation near the sea-coast. In the cases of infants at the breast, due attention should be paid to the states of health and of the milk of the nurses; and the treatment of the infant should be partly conducted by directing such means to the mother or nurse as will correct or improve this secretion. If this object cannot, or is not likely to be attained, a healthy nurse should be procured. If the complaint appear about or after the period of weaning, a sufficient quantity of ass's milk should be given daily; or the farinaceous articles of diet may be allowed with mutton, veal, or beef broth or tea; or warm gellies, or the yolk of an egg, may be taken once or twice daily.

36. C. In the *second or deformed stage*, the treatment should be in many respects the same as now described. The febrile irritation sometimes observed is still more remarkably the result of debility conjoined with a morbid state of the blood than in the first stage; and hence it ought not to interfere with the adoption of tonic and restorative medicines, which, when duly selected, will be the most efficient means of improving the various secretions and excretions. As in the former stage, so in this, a particular attention should be directed to the urine; and according to the states of this excretion, as well as of that from the skin, the decoction or infusion of cinchona may be given with the nitric or muriatic acid, or with both; or with the solution of potash, or with BRANDISH's alkaline solution, or with a preparation of am-

monia, and some warm aromatic. The sulphate of quina with sulphuric acid may be substituted for the above, especially when the skin is flabby and covered with perspiration, and if there be obvious anæmia, or even in other circumstances, the compound steel mixture may be given as above (§ 34.), or the muriated tincture of iron in the infusion of calumba or quassia, or the iodide of iron in the syrup of sarza. This is the best preparation of iodine for this disease; although the iodide of potassium, taken in a tonic decoction or infusion, is often of service. In this stage, and not less so in the first, the cod-liver oil will be found very remarkably beneficial. I have prescribed it for every case of this complaint which I have seen since 1844. This oil is now prepared by the principal chemists in the metropolis from the fresh livers; and, thus prepared, it is a much less unpleasant medicine than in the state in which it was formerly procured. But of the several fish-oils which may be prescribed — those of the cod, of the ling, of the skate, &c. — the oil from the liver of the torsk is certainly to be preferred, according to my observation; and it may be readily procured from the Shetland Isles, the only place in this kingdom where this fish is abundant.

37. In this stage more particularly several earthy preparations have been recommended with the view of furnishing the materials for the reossification of the bones. But, as the disease is not so much the result of any deficiency of the elements of bone in the nutriment, as in the failure of organic nervous or vital energy, whereby these elements form and unite in the tissues during the processes of assimilation and nutrition, so it may be inferred, that much less importance may be attributed to the administration of substances containing the constituents of bone, than has been attached to it by some writers. Nevertheless, as several of these substances are useful in controlling certain of the symptoms, or in exciting the actions of assimilating organs, or in rousing organic nervous power, they may be given with advantage, especially lime-water charged with fixed air, magnesia similarly charged, or effervescing, or either of these conjoined with other means; the murates or chlorides of lime, or of baryta in minute doses, and the phosphoric acid and certain of the phosphates; but it is doubtful whether these latter are beneficial or injurious in any stage of rickets. I have prescribed the chlorate of potash with other tonics in several instances with benefit; and when the liver is torpid, small doses of mercury with chalk and rhubarb; or, when the stools are frequent, acid, and yeasty, with the compound cretaceous powder, or with this powder and minute doses of opium. In these latter circumstances, the treatment above recommended when colliquative diarrhœa is present (§ 34.) may be adopted, or powders may be given containing small doses of powdered cascarilla bark, cinnamon, and the carbonate or sulphate of iron. Most of the preparations of iron are beneficial in this stage, more especially those already mentioned, and the citrate of iron, the tartrate of iron and ammonia, and the vinum ferri, either of which are readily taken by children.

38. In this stage, the same *external means*, diet, and *regimen* as was prescribed for the first should be observed, varying each, according to the effect

and the peculiarities of the case. BOERHAAVE, VAN SWIETEN, and others, have advised, and I am confident that the advice is judicious, that the utmost care should be taken to preserve the beds and bed-clothes clean, fresh, and perfectly dry; and to dust the surface of the body with tonic, astringent, and aromatic powders, especially when the perspirations are colliquative or weakening, and after warm salt-water bathing or sponging, or after the tepid salt-water douche on the back, loins, or limbs. In this state of the complaint, tepid chalybeate baths, variously medicated baths, and the thermal springs, recommended for chronic RHEUMATISM (§ 142.), may be employed, as well as the Tunbridge waters, and the natural or factitious mineral waters recommended for that disease (§ 151.). The child should be kept as much in the open air as the temperature and weather will permit, and in the sun-shine. The utmost care ought to be taken that the position, either when lying, or when being lifted or held up, should be such as not to bend the bones from their natural direction. As the weight of the trunk and head is apt to bend the long bones when the patient is allowed to stand or walk, either too early or in this stage; and, as the weight of the head is liable to produce curvatures of the spine, when the patient is allowed to sit too long, or too much, a recumbent or reclining position should be adopted at intervals, or for a considerable period during the day. A properly constructed couch or bed, on which the patient may lie either on the back or on the abdomen, and use his arms and hands without difficulty, will prove of great benefit; and a recourse to frictions of the surface, especially over the back and abdomen, will at the same time be of service. Galvanic or magnetic electricity will be productive of much advantage in this disease, especially if aided by judicious treatment, regimen and diet. When the legs are chiefly or only affected, standing or walking should not be allowed. In these cases, particularly when the curvatures are outwards, I have often directed the legs to be tied together, or confined by a broad band, bandage, or handkerchief, so as to prevent walking, and to resist the curvatures, or press the flexures in a proper direction. For this, and other kinds of curvature, various mechanical modes of treatment have been employed; and iron, or steel, or metal supports, or implements of different kinds and shapes, have been adopted. But these means, although sometimes of service in diminishing superincumbent pressure, or in resisting the disposition to flexure, are often injurious by preventing the muscular actions, and by embarrassing the circulation of the parts or limbs. Moreover, all metal supports are injurious, however carefully they may be covered, by conducting the animal heat, and the electricity always circulating through the frame and favouring the passage of both into the surrounding air. When the complaint is either so severe or so extensive as to implicate the vertebral column, or the parietes of the chest, or both the one and the other, the remarks I have offered on deformities of the CHEST, as well as of those of the SPINE, are altogether applicable to those more extensive forms of rickets. (See CHEST and SPINE).

39. II. RICKETS IN ADULTS. — SYNON. — *Mollities ossium*; *Osteomalacia*; *Malacosteon*, *softening of the bones in adults*, &c. — This com-

plaint, although resembling in many respects the rickets of children, is in others a different disease; more especially as respects the changes which take place in the texture and fibrous membranes of the bones. It is more frequently observed in females than in males, and it oftener affects the pelvis and spine than other bones; but it may extend to nearly all the bones, such cases, however, being very rare. I can add nothing at this place to what I have adduced respecting the *causes*, *nature*, and *treatment* of *mollities ossium*, or the *softening of bones in adults*, in the article OSSEOUS SYSTEM (§ 27. et seq.).

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ROSE-RASH. — SYNON. — *Roseola* (from *rosa*, a rose; or from the Italian *Rosso*, red), Willan, Bateman, &c.; *Rossalia*, *Rossania*, Auctor. — *Exanthisma roseola*, Young; — *Exanthesis roseola*, Good; — *Rubeola spuria*, Frank; — *Rosellina*, Auct.; — *Roseole*, *Eruption rosacée*, *Fausse rougeole*, Fr.; — *Rothlen*, *Rother hund*, Germ.; — *Red-rash*, *False Measles*.

CLASSIF. — 3d. Order, Exanthemata; 4th. Genus, *Roseola*; Rose-coloured efflorescence (Willan). III. CLASS. III. ORDER. (Author).

1. DEFINIT. — *An eruption of small rose-coloured patches, of irregular forms, very slightly elevated, not papular, transient, and passing into a deeper roseate hue as they slowly disappear; the patches being either limited to a part, or to the limbs, or dispersed over the body, preceded and attended by slight fever, and non-infectious.*

2. Under the term of *roseola*, modern writers have described several forms of eruption, which are chiefly symptomatic, and which, in appearance, are intermediate between erythema and urticaria; but more closely allied to the former than to any other eruption. Indeed RAYER doubts as to the propriety of considering *roseola* as a distinct genus, and of not viewing it as a variety of erythema. Although approaching the appearances of the milder forms of measles and scarlatina, yet the severer, the specific and infectious characters of these, can suggest neither resemblance to, nor alliance with this eruption.

3. I. DESCRIPTION. — This eruption is generally preceded by slight fever and disorder of the digestive organs, for two, three, or even four days, rose-coloured patches then appearing either on parts or over the body. The patches are larger, paler, and less uniform than the spots of measles. They are also more distinct, and are separated from each other by intervals of healthy skin. They are attended by itching and tingling, and frequently disappear in twenty-four or thirty-six hours; but they sometimes subside, and return alternately for seven or eight days. The varieties of this eruption have been divided into the *idiopathic* and *symptomatic* — the latter accompanying or complicating other diseases; the former depending upon less obvious changes, although frequently proceeding from disorder of the secreting and excreting functions.

4. i. *Roseola æstiva* is the most severe of the more idiopathic varieties. It is preceded and attended by constitutional disorder, and generally appears first on the arms, face, and neck, spreading in the course of a day or two to the rest of the body, and causing itching and tingling. The patches present the appearances just described, and are at first of a lively red, but soon acquire a deeper tint. The pharynx often presents the same hue, and a roughness or dryness is felt on swallowing. The eruption continues fully out on the second day, but immediately afterwards begins to decline; slight patches of a dull red often con-

tinue to the fourth day, and disappear entirely on the fifth, with the constitutional disturbance. Sometimes the efflorescence is limited to parts of the face or neck, or breast or shoulders; and is very slightly elevated. The patches itch very much; but are without the prickings or stinging of urticaria. They last at most a week; but they occasionally appear and disappear again and again, either owing to violent moral affections, or to spiced food or heating beverages, or to no very manifest cause. The recession of the eruption is often attended by disorder of the digestive organs, or by headach, or by lassitude, which are relieved by the return of the efflorescence. This variety is met with in summer, most frequently in females of irritable temperament, and in delicate persons with an irritable state of the skin. It is often connected with disorder of the digestive canal; and, in its external characters, is intermediate between erythema and urticaria.

5. ii. *Roseola autumnalis* attacks children in the autumn. It appears in the shape of distinct circular or oval spots, of a dusky red colour, that gradually increase until they reach the size of a sixpence or shilling, and are observed chiefly on the arms and legs. The patches sometimes end in desquamation; are not attended by itching or tingling, and rarely continue longer than a week. This variety is evidently very closely allied to, if not a form of, erythema.

6. iii. *Roseola annulata* is attended in some cases by febrile symptoms, and is then of short duration; but, in others, there is little or no constitutional disturbance, and the eruption continues much longer. It appears nearly on every part of the body in the form of rose-coloured rings, of various sizes, the centres of which are of the natural hue of the skin. The rings at first are only a line or two in diameter; but they gradually enlarge to half an inch, or even more. They are less vivid in the morning; but they revive towards evening or night, and are attended with itchiness and tingling. As they vanish or fade, the stomach is disordered; and languor, pains in the limbs, and vertigo, are complained of. In the chronic state of the eruption, the rings have a sallow or discoloured hue, and often recede and recur alternately, thus enduring for weeks, or even months. I agree in the opinion of M. RAYER that this is merely a modification of *erythema annulatum*.

7. iv. *Roseola infantilis* presents spots of small size, and more closely grouped together; so that, looking only at the eruption, and without reference to other, especially the catarrhal symptoms, it may be mistaken for *measles*; but there is less roughness of the surface than in this latter. This mistake has, however, been often made. This variety of roseola attacks children during dentition, or during febrile affections or disorders of the digestive canal. It may occur only for a single night, or it may come and go alternately for several days. It may also appear in succession in different parts of the body. It is accompanied with febrile symptoms, and more or less disorder of the digestive organs. As respects the extent of eruption, and the sensations experienced, this variety closely resembles *roseola æstiva*.

8. v. *Roseola variolosa* is symptomatic of the natural and inoculated small-pox. M. RAYER states that it precedes the former more rarely than the latter, in which it is calculated to appear about

once in fifteen cases, in the course of the second day of the eruptive fever, which corresponds with the ninth or tenth day after the inoculation. The efflorescence is first perceived on the arms, the breast and face, and on the following day extends to the trunk and extremities. The long, irregular and diffused patches leave numerous intervals between them. This variety of roseola is, in a few cases, characterised by an almost generally diffused efflorescence, slightly prominent in some points. It lasts about three days; on the second and third, the variolous pustules may be distinguished amid the roseola efflorescence, by their roundness, prominence, and hardness, and the whiteness of their summits. As soon as the pustules appear, the roseola declines. This variety has been regarded as indicative of an eruption of distinct small-pox; but this is generally not the case; more especially when the roseola is of a deep or dusky tint, and the eruptive fever severe, the small-pox eruption becoming then confluent. The earlier writers mistook this variety of roseola for measles, and concluded that measles were sometimes converted into small-pox. This variety occurs chiefly in persons having a delicate and irritable skin, and is very closely allied to erythema.

9. vi. *Roseola vaccina* is sometimes observed in children from the eighth to the tenth day after the insertion of the vaccine virus. It appears as small confluent spots or patches, or is diffused like variolous roseola, commencing when the areola is formed around the vaccine vesicle, from whence it extends irregularly over the surface of the body. It is accompanied with frequency of the pulse, anxiety and general disturbance; but it occurs less frequently than the variolous variety. It rarely continues longer than two or three days; affects chiefly those of a delicate and irritable skin; and, like the preceding, is intimately allied to erythema.

10. vii. *Roseola febrilis* and *R. miliaris* are merely modifications of erythema, and are, in rare instances only, observed in the course of fevers or accompanying miliary vesicles, especially when those are attended by much perspiration. The patches are of a bright rose-colour, of an oval shape, slightly prominent and smooth, and occur chiefly on the chest and insides of the arms. There is seldom itching. The patches usually disappear after two or three days.

11. viii. *Roseola arthritica* is the appearance of a rose-coloured rash in connection with attacks of *gout* or *rheumatism*. This, however, is only a rare occurrence in this country, the efflorescence either preceding or attending the arthritic disease. Dr. SCHÖNLEIN has described this variety under the term *Pelliosis rheumatica*; and Dr. FUCHS states, that the rheumatism which is thus complicated is endemic in Würzburg; that it attacks adult males most frequently during winter and spring, when the air is cold and moist; and that the eruption is then oftenest met with. The pains are usually experienced in the articulations and extremities; remit, change their place, are increased by cold, and diminished by the warmth of bed. Gastric symptoms, shiverings followed by febrile reaction, dry and hot skin, loss of appetite, and furred tongue, usher in the eruption, which appears on the second, third, or fourth day after the commencement of these symptoms,

usually at first on the legs, and sometimes going no further, but more frequently coming out on the arms and shoulders at the same time, very rarely on the trunk, and never on the face. The eruption consists of small, distinct spots, varying from the size of a millet seed to that of a lentil, rounded, and of a deep red, or violet red hue. The spots are not so numerous as the vesicles of miliaria, or as the spots of measles. Upon the occurrence of the eruption the fever ceases, and the rheumatic symptoms abate. The spots, whose numbers may be increased by successive crops, grow pale, and terminate by a slight furfuraceous desquamation. The arthritic roseola described by PETZOLD and HEMMING, is similar to that just noticed; but the exanthematous rheumatic fever, which was epidemic in the West Indies in 1827 and 1828, and which was described by STEDMAN, NICHOLSON, and COCK, and supposed by RAYER to have been this variety of roseola, was more nearly allied, as regards the eruption, to scarlatina than to roseola; and it moreover appeared to have been, in the opinion of, and according to evidence by these and other writers, an infectious malady.

12. ix. *Rubeola choleric* is one of the forms of eruption which occasionally appears on the surface of the body during the consecutive fever of the *choleric pestilence*. This variety was first noticed by Dr. KEIR at Moscow, and more fully described by Dr. BABINGTON and MM. DUPLAY and RAYER. But the eruption observed in some cases of this pestilence does not always present the rubeolar characters; for I have observed it to possess, in different cases, more of the appearances of scarlatina, of measles, of nettle-rash, of erythema, and even of erysipelas, with the attendant tumefaction, than of roseola. M. RAYER describes the eruption as occurring most frequently in women, appearing first on the hands and arms, and extending to the neck, breast, abdomen, and lower extremities. At its commencement the spots were of an irregularly circular form, of a bright red colour, elevated above the surface, and but slightly itchy. They were most numerous on the hands, arms, and chest; and in some places they were crowded, or almost confluent, more especially on the chest, where they sometimes formed, by their confluence, patches as large as the hand, somewhat raised, and well defined. The eruption then presented a dirty pink, or rose colour. About the sixth or seventh day, the epidermis cracked, and was thrown off in large scales, where the eruption had existed. M. RAYER has seen this eruption complicated with inflammatory affection of the fauces and tonsils, and its disappearance followed by an aggravation of the symptoms, and sometimes even by death.

13. II. DIAGNOSIS.—*a.* Roseola, especially the varieties autumnalis and annulata, is distinguished with difficulty from *erythema*. In both kinds of eruption, the patches are irregular and uniform in tint; but are generally smaller in roseola than in *erythema*. When the febrile disturbance of the former is well marked, and the patches of eruption dispersed over the body, then the diagnosis between it and the latter will not be difficult.—*b.* Roseola æstiva, and *R. infantilis*, most closely resemble the eruption of *measles*, for which they have been often mistaken; but the absence of catarrhal symptoms, the less degree of fever, the larger size and more irregular form of the patches, the progressive ad-

vance of the patches from the extremities to the trunk, and their uniform redness, distinguish these varieties from the punctiform appearance of the eruption of *measles*. The infectious and often epidemic nature of the latter should also be taken into account. SYDENHAM considered roseola to be a variety of measles, and several other writers believed that the former was only a spurious variety of the latter. HOFFMANN, BORSIERI, and SELLE, pointed out the difference, and contended that roseola was an exanthem *sui generis*, and distinct from the other exanthemata.—*c.* Roseola may be distinguished from *scarlatina* by some of the circumstances just adduced; but more especially by the severity of the constitutional symptoms, and the state of the throat and tongue.—*d.* The light-coloured and raised spots and wheals of *urticaria* can hardly be mistaken for the more uniformly red patches of roseola. The itchings, tinglings, prickings, and stings, are much more severe and generally experienced in the former than in the latter.

14. III. CAUSES.—Roseola occurs chiefly in children, in females, and persons of a delicate constitution, or irritable temperament. It is generally occasioned in infants and children by teething and irritation of the digestive canal. In adults it is most frequently caused by errors of diet or regimen, especially during summer and autumn; by hot spices; by overheating the body by exercise or exertion; by drinking cold fluids, or exposure to cold air when the body is perspiring; by eating shell-fish, or other indigestible substances; by acid fruits, pickles, preserves, &c.; by heating or exciting beverages; and by whatever irritates the stomach or bowels. It may be symptomatic of a morbid state of the blood consequent upon impaired or interrupted secretion and excretion, especially from the skin, liver, or kidneys; and in females from the uterus.

15. IV. TREATMENT.—This eruption requires but little treatment beyond the removal of the causes, remote and pathological, as far as they may be manifest, and the due promotion of the secretions and excretions. When the eruption occurs in the course of acute or constitutional disease it should be viewed as critical, and be interfered with as little as possible. When it affects children, small doses of hydrargyrum cum creta, soda, and rhubarb; or simply the grey powder and magnesia, followed after two or three doses, by a little castor oil, will generally be sufficient to remove it; and if the gums be hot or swollen, and the state or period of dentition suggest the operation, scarifying the gums will be of service. In some cases, the liquor ammoniæ acetatis with spiritus ætheris nitrici, in camphor water, or in any other suitable vehicle, will be of further benefit. In adults, after duly evacuating the bowels, and promoting the alvine secretions, tonic infusions or decoctions, with nitre and alkaline sub-carbonates, will be taken with immediate advantage. When there is much itching and tingling of the skin, a tepid, or warm bath will give relief. When any of the excretions are disordered—whether the biliary, the intestinal or the urinary,—the treatment should be directed accordingly; and, if menstruation is difficult, painful, or scanty, the biborate of soda may be given with an aloëtic preparation and the compound galbanum pill, and when the eruption has disappeared, the *mistura ferri composita*, or

other preparations of iron, may be taken in such combinations as the peculiarities of the case will suggest. The more obviously symptomatic varieties of roseola should be treated according to the nature of the disease, of which it is merely a sympathetic, and generally a not very important manifestation, unless when it assumes a deep or dark hue, and then there is a manifest indication for the employment of tonic and restorative means. The diet should be light, chiefly farinaceous, and moderate; and the regimen in other respects antiphlogistic.

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RUBEOLA. — SYNON. — *Morbilli scarlatinosi*, *Scarlatina morbillosa*, *Scarlatina hybrida*; — *Morbilli*, *Scarlatina*, *Roseola*, *Rossania*, Auct. Var.; — *Rougeole*, *fausse rougeole*, Fr.; — *Rötheln*, *Feuermasern*, Germ.; — *Rosalia*, Ital.; — *Bastard measles*, *Bastard scarlatina*, *hybrid measles* or *scarlet fever*.

CLASSIF.—III. CLASS. III. ORDER. (*Author*).

1. DEFIN. — *Fever attended by coryza, redness and watering of the eyes, redness and soreness of the throat, pains in the head, back, and limbs, attended on the third or fourth day by the sudden and general eruption of a red efflorescence, which terminates about the tenth day in desquamation; the disease presenting the characters of measles and scarlet fever conjoined.*

2. It is doubtful whether or not this should be viewed as a distinct or specific form of disease, or merely a variety of either measles or of scarlet fever, in which many of the characters of either the one or of the other predominate. I have, as will already appear, considered it as a hybrid, combining the chief characteristics of both these exanthemata. Since the days of the Arabian writers, until recent times, certain of the exanthematous fevers were considered as being merely modifications of the same disease; and it was only as late as the close of the last century that the distinctions between scarlet fever and measles were fully determined and generally recognised. More recently still the differences have been more absolutely believed in, than an extended and diversified experience warrants; for the medical writings of the 17th and 18th centuries contain the histories of epidemics, which, according to the descriptions they furnish, present characters which belong both to measles and to scarlet fever. The experience of physicians, also, that has been prolonged through a number of years, or been extended to different countries, has furnished instances of either sporadic cases, or of prevailing and malignant epidemics, in which some, if not the majority, of the cases have presented the mixed features of measles and scarlatina. Even the notices of measles contained in the works of

RHASES and other Arabian physicians, furnish indications that this form of disease, to which the term rubeola has been applied by myself and others, was actually known to them, they viewing it as a variety of measles; although they afford no distinct proofs of an acquaintance with scarlatina.

3. From the description which *J. FRANK* has given, it is evident that he misapplies the term rubeola to the more general and severe forms of roseola; and *M. RAYER* appears to entertain a similar opinion. Indeed the French writers use the word rubeola either with reference to measles or to roseola, to the former especially, and have not recognised this hybrid malady, which has engaged the attention of so many German writers since the commencement of the present century, and whose existence clears up many of the difficulties which present themselves on reading the accounts of epidemics that have possessed the mixed characters of this malady. — *RICHTER* and *HILDENBRAND* have defined Rubeola to be a species between measles and scarlet fever. The latter writer states “that *Rubeola* holds a place between measles and scarlet fever, the name being derived from its deep red colour. Authors differ much as to its nature, and have applied the term indiscriminately to measles and to other species of exanthem. Neither in France, nor in Italy, are these names appropriate to measles and to rubeola individually; *rougeole*, in the former country, and *rosolia*, in the latter, being applied indiscriminately to both.” The Arabian writers viewed the eruption to which recent German writers have applied the name rubeola as a variety or modification of measles; and at a much later period *INGRASSIAS*, *FORESTUS*, *BALLONIUS*, *SENNERTUS*, and others, have so confounded rubeola with scarlet fever, as that the accounts they have given are equally applicable to either species of disease, owing both to their short and imperfect descriptions, and to their arbitrary or indiscriminating use of the terms rubeola and scarlatina. Towards the close of the last century, *SELLE* described measles (*morbilli*) and rubeola as distinct affections, and during the commencement of the present century, several German writers, especially *ZIEGLER*, *REIL*, *FIELITZ*, *JAHN*, *HUFELAND*, *SCHÆFFER*, *FORMEY*, *FLEISCH*, and *HEIM*, have given correct descriptions of epidemic rubeola.

4. I. DESCRIPTION. — (*a.*) During the febrile stage, rubeola furnishes most of the catarrhal and febrile symptoms observed at the commencement of measles and scarlet fever: a defluxion from the nostrils, redness of the eyes, frontal headach, cough, watering of the eyes, great heat and dryness of the skin. Sometimes rheumatic pains, retchings, somnolence, dull headach, itching of the eyes, are observed to precede the eruption. Inflammatory redness of the fauces, tonsils, and pendulous velum of the palate, is never absent unless in the slightest cases. According to *HEIM* patients emit a similar odour to that exhaled by those affected by scarlet fever.

5. (*b.*) On the third or fourth day an eruption or exanthem breaks out over the whole body, as if at a single effort. It is however more scanty on the face; and it presents two forms, the one consisting of red spots, with irregular margins, varying from a line to a line and a half in diameter, and remaining distinct throughout their course; the other of red spots, of the size of millet seeds,

possessing no distinct margins, and becoming paler from the centre to the circumference. In mild cases, the efflorescence is discrete; but in the severer cases, it is much more abundant, and the spots larger, being about two lines in diameter; so that, on the second day of the eruption, it imparts to the whole surface a deep and almost equal red colour. Rubeola may now be readily mistaken for scarlatina; but it may be distinguished by the circumstance of the red spots being different from the scarlatinous exanthem, those pressed on by the finger becoming pale, but very quickly regaining their red hue from their centres to their circumferences. The general redness of rubeola, which equals that of scarlatina, fades after two days, the spots still remaining, and small miliary phlyctenæ appear and impart a roughness to the skin, and become filled with a little whitish and thick fluid. During the eruption the constitutional symptoms of the first stage are increased, and others often supervene, as hoarseness, or loss of voice, severe cough, oppression in the chest, vomiting, delirium, or convulsions in young subjects. After the eruption has come fully out, which takes place within twenty-four hours, it continues from six to ten days, retaining its assigned form, and the anginous and febrile symptoms undergo a marked diminution, unless when the affection of the throat becomes aggravated, which sometimes occurs.

6. (c.) About the tenth day from the commencement of the disease, the eruption becomes pale and disappears, *desquamation* supervening in proportion as this change proceeds, the anginous and febrile symptoms equally subsiding with the progress of desquamation. This change is often connected with a critical evacuation, as sweats, hypostatic urine, epistaxis, &c. Desquamation proceeds from the centre of each spot, the scales presenting a round or stellated appearance, and without any unpleasant sense of itching.

7. (d.) In the most unfavourable cases, rubeola either *terminates* in death, owing to the same circumstances and changes as are observed in measles or scarlet fever, or occasions those visceral affections and their consequences, which are described in connection with these maladies, and which often render the ultimate issue doubtful. Of these consecutive affections, the most frequent are those of the respiratory passages and lungs; of the glands, and of the digestive and urinary organs; and dropsy, especially anasarca. Rubeola, although frequently a mild, is sometimes a most severe or even dangerous malady, especially when it is epidemic. The epidemics described by SELLE presented a malignant character, and were fatal to many; and that noticed by FORMEY was of a putro-adymic kind, and was very fatal in Berlin.

8. II. NATURE.—Several authors believe rubeola to be a specific contagious disease, and therefore belonging to the class of pestilential fevers. Some, however, consider it a variety of one or other of the diseases which it so closely resembles—of either measles or scarlatina. HILDENBRAND states “that some consider it with HUFELAND, SHÄFFER, FORMÄY, and HEIM, as a variety of scarlatina; and that KAPP, WICHMANN, and REIL view it rather as allied to measles; whilst UEBERLACHER, JAHN, and FLEISCH believe that no essential difference exists between measles, rubeola, and scarlet fever.” According to this last opinion, rubeola should be

viewed as the connecting link between measles and scarlet fever. That rubeola, on the one hand, is very nearly allied to scarlatina, is shown by the affection of the throat, by the intense redness of the skin, by the mode of desquamation, by the peculiar odour proceeding from the patient, by the contemporary existence of both forms of exanthem in different persons in the same locality and by the consecutive appearance of dropsy in some instances; but that rubeola, on the other hand, is equally allied to measles is shown, by the catarrhal symptoms—by the coryza, cough, watering of the eyes, and hoarseness; by the form of the segregated spots, forming a part of the eruption, and by the occasional prevalence of it at the same times and places as measles, as HILDENBRAND states that he had himself observed. Many writers further allege, as proofs that rubeola is merely a variety of measles, the belief in scarlatina being a comparatively recent disease, whilst notices of rubeola are found in connection with measles in the writings of the Arabian physicians. I believe that rubeola is not a disease, *sui generis*, nor yet a modification merely of either measles or of scarlet fever, but a hybrid of these two fevers, presenting sometimes a predominance of the symptoms characteristic of the one, at other times of those distinguishing the other, and not infrequently an equal combination of the features of both. In this opinion I differ little from that held by HILDENBRAND. REIL believed rubeola to be a species of exanthem between measles and scarlet fever whilst MARCUS considered it to hold the same relation to both these exanthems as exists between true and spurious small-pox. But it may be asked, to what cause can this hybrid state of disease be imputed? Can the copulation of measles and scarlet fever be assigned to epidemic states of the air, or epidemic constitution, or to the conditions of season or weather? Or may it be considered an accidental combination, or a coincident appearance of both maladies, in an epidemic form, at the same time, and amongst the same population, the characteristic features of either malady predominating according to the predisposition, constitution, &c. of the individuals affected? This latter view appears by no means unreasonable, although the dogma of JOHN HUNTER, so long believed in, but now disproved, that two diseases cannot exist in the human œconomy at one time, may still appear to some, but without sufficient reason, to militate against it (See MEASLES, § 48.)

9. III. TREATMENT.—The treatment of rubeola must entirely depend upon the type or character it assumes, either sporadically or epidemically; and hence the principles of treatment assigned to such types of the diseases of which it is the hybrid—of measles and of scarlet fever,—should guide the physician in his treatment of this mixed malady. When the disease is mild, then our means should also be mild, and be directed chiefly to the promotion of the secretions and excretions—and consist chiefly of cooling diaphoretics and aperients, and of diuretics; avoiding at the same time all causes, both intrinsic and extrinsic, that may favour the supervention of internal complications, or of unfavourable sequelæ, and restoring and promoting the functions of the skin by external warmth and other means which circumstances may require. When the type of the disease is truly inflammatory, then antiphlogistic

measures should be prescribed, but with the recollection that however inflammatory it may appear, that it is generally characterised by more or less asthenia, and by an obviously morbid state of the blood, pathological conditions requiring much circumspection as well as decision in the choice and administration of our means of cure. If, on the other hand, the disease assumes adynamic, nervous, septic or putrid characters — features of more or less malignity, — as observed in some of the epidemics which have appeared on the Continent, remedies of a tonic, restorative, astringent, stimulant, antiseptic, or alterative nature, should be prescribed; combining, varying, or adapting each and several of these to the pathological conditions of individual cases, as I have attempted to illustrate when discussing the treatment of MEASLES, and of SCARLET-FEVER.

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RUMINATION. — **SYNON.** — *Ruminatio humana*; *Human rumination*; *Merycismus* (μυρικήσιμος, *ruminatio*); *Mérycisme*, Fr.; — *das Wiederkäuen*, Germ: —

CLASSIF. — **I. CLASS.** — **I. ORDER.** (*Author.*)

1. **DEFIN.** — *The regurgitation of food, which had passed into the stomach, and which is remasticated and again swallowed.*

2. This affection is of rare occurrence, especially in a simple and complete form. It is much less rare as an occasional, incomplete, and associated occurrence; and in alliance with some form or other of dyspepsia.

3. 1. **HISTORY OF.** — It is difficult to determine whether or not this affection, — for it may not be called a disease, seeing that it is attended by considerable enjoyment, — was known to the ancients. When we consider the habits and luxurious indulgences of the civilized and wealthy amongst the Greeks and Romans, and the means which the most notorious gourmands, in their respective eras of luxury, employed to unload the stomach in order that a second gratification of the palate should be entered upon, it may be inferred that this affection would have been viewed as a source of supreme gratification; and as one to be indulged in or cultivated, and not one to be got rid of. And probably the enjoyment would not have been marred even if a similar opinion had been entertained by their physicians to that promulgated by honest

FABRICIUS AB AQUAPENDENTE, who believed that the human subjects of this affection are endowed with a double stomach, and that other bestial endowments might, in process of time, appear in them or in their descendants.

b. **GALEN** must have had ample opportunities of observation amongst the cases of indigestion he could not fail of having met with in the luxurious but peaceful court of the ANTONINES, yet he does not furnish us with a single instance of rumination; and amid the various stomach-aches and affections of MARCUS AURELIUS, which both puzzled the brain and caused the anxiety of this immortal physician to such a degree as to make him afraid that a glass of spiced wine might be too hazardous a remedy for the good emperor, the faculty of regurgitating his food for a second mastication appears not to have entered into the number; unless we suppose that, this not being considered a disease, the interference of **GALEN** was not required, upon the ground that matters of taste, in the animal as well as in the mental application of the word, give a heightened enjoyment by their deliberate rumination.

5. **FABRICIUS** has furnished two of the earliest instances of human rumination on record. The first was that of a nobleman, in whom it generally took place an hour after his meals; which, whether solid or fluid, were always returned to undergo a second and more deliberate mastication. **FABRICIUS** has thought it just to mention; that the father of this person had a horn growing from his forehead; and with great good faith has added, “ex quo forte datur nobis intelligi, parentis semen aliquam habuisse cum cornuigeris animalibus, neque mirum fuisse genitum filium simile, quid a parente contraxisse,” — that, although the son did not inherit his father’s horns, yet he possessed the accompanying faculty of rumination.

6. The second instance, with which honest **FABRICIUS** has favoured us, was in a monk, who, although possessed of a most ravenous appetite, died of marasmus. This monk combined the bestial attributes of both the father and son just mentioned; for, in addition to his faculty of rumination, he had his forehead adorned with two horns, which, in a monk, he avers was the more singular. **JOHN BURGOWER**, who visited this monk, in the company of **JOSEPH PREVOT** and **THOMAS MINADOUS**, wrote a volume on this very illustrious person, and furnished **FABRICIUS** with the particulars which are inserted in his works. **BURGOWER** also adds that the brother of this monk was also adorned with two budding horns, — “duorum cornuum vestigia gestasse,” as a striking feature of family likeness; or, as this author will have it, “quod enim fratris erat, id monacho ruminanti simul gratis impertiunt.” But this interesting individual did not ruminate, unhappily for the argument of **THOMAS BARTHOLIN**, who, from these two instances, has hastened to the conclusion, with true medical logic, and with faithful dependence upon the obvious analogy of the “cornuigeræ pecudes,” that all human ruminants are adorned with horns; and has also averred, with equal truth, that they will be found, on dissection, to be possessed of a double stomach. This interesting doctrine cost the laborious **CONRAD PYER** no small trouble to refute: and he has concluded in his turn, taking his honour to witness (for he has treated the subject with great gravity)

that this did not agree with his experience, for there are many horned individuals who do not ruminate.

7. DANIEL SENNERT has furnished an account of a man of forty who possessed the ruminating faculty from a child. He found no difficulty in accounting for the existence of this affection in that instance, when he learnt that this individual, when an infant, had lost his mother, and been fed during his nonage with the milk warm from a cow. SENNERT accordingly, more soberly than legitimately, concludes, that he sucked it in with his nurse's milk:—"Quamobrem deficiente educatione, cum orbus infans, et institutionis humanæ inops nutricem vaccam observaverit tuereturque attentius, ipse ruminationi paulatim assuevit, sodalitiis familiaritate degenerans, &c.!"—PHILIP SALMUTH has adduced a case of human rumination which he observed, and stated a fact illustrative of its cause, that is met with in most human ruminants. The subject of the affection ate ravenously, swallowed his food after very imperfect mastication, and ruminated about a quarter of an hour after leaving table.

8. JOSEPH FABER LYNCEUS has immortalized the highly respectable ANTHONY RECCHI, who, dinner being concluded, and seated over his cups with his friends, was always obliged to retire, about half an hour after the meal, into a remote corner of the apartment, and then ruminated the ingesta, undisturbedly, and as quickly as possible; which having done, he enjoyed uninterruptedly the society of his friends. "Having been asked how he became obliged to indulge this propensity, he answered that, from a boy he had been subject to acid eructations; and that, after having reached his thirtieth year, he found it impossible to resist admitting into his mouth the food that constantly regurgitated from his stomach. Being further interrogated whether the second mastication of his food afforded him any gratification, 'Indeed,' he replied, 'it is sweeter than honey, and accompanied with a more delightful relish.' This affection might be said to have been in the family of the distinguished RECCHI; for he was blessed with two grown sons, the elder of whom was also endowed with this delightful faculty, but had it more under control than the father, as he could prevent it altogether when in company. The younger son had not then come to its possession.

9. G. H. VELSCH has recorded the case of an inhabitant of London, who, in the fortieth year of his age, and of sound health, always returned his food to undergo a more deliberate mastication. Rumination always took place in this person from one to two hours after a meal; and even at the second hour it still preserved a pleasant taste, and was without any degree of acidity. This, however, was not the case with a young woman seen by DANIEL LUDOVIC, for she returned her food with insufficient pleasure; and the regurgitated matters were often possessed of a disagreeable taste. He states that bitters and stomachic purgatives did not remove this affection, which, however, was not always regular in its occurrence; and although emetics and cathartics prevented it for a short time, it soon returned. With all due respect for DANIEL LUDOVIC I consider this affection more allied to apepsia, than to rumination, or as a state intermediate between them.

10. JOSEPH CONRAD PYER has recorded three

cases of this affection, one of the subjects of which was idiotic, one was a female, and the three were rustics; and he sagely endeavours to prove, from the circumstance of these persons having been rustics and cowherds, that the frequent sight of the ruminating process had impressed their brains with a similar propensity, which, although at first imperceptible, had nevertheless ripened into maturity. SLARE has recorded, in the *Philosophical Transactions*, at a time when the Royal Society was less fastidious as to the publication of papers, the case of a Bristol man who ruminated not only the more solid ingesta, but also fluids, as milk and soups. But, amid such imperfect information as philosophers in those days were quite satisfied with, I find it stated that his victuals always seemed to descend imperfectly into the stomach, and to lie in the lower part of the throat. However, the portion first taken was the first ruminated. Nevertheless, I suspect that this case was one of sacculated œsophagus similar to those which have been more recently published by my friend WORTHINGTON and others.

11. More recently several cases of human rumination have been recorded by MM. TARBES, PERCY, LAURENT, CULLERIER, and still more recently by M. RICHE, SCHMIDTMANN, and myself. The first case which came under my observation was treated in 1819 and 1820, and the history of it fully detailed in the forty-fifth volume of the *London Medical and Physical Journal*. The subject of it is still (1848) alive and in good health. Since the publication of that case, two others, one of them in a medical man, have been treated by me; and I have had reason to believe that instances of partial or occasional rumination are not so rare in the human subject as is generally supposed.

12. II. SYMPTOMS.—The cases of this affection, which I have seen, were of several years' duration before they came under my care. The affection was stated to have been partial or occasional at first, and had become more constant and complete by neglect and indulgence, and by the habit of quick or voracious eating. The *symptoms* of the fully developed case, which continued for some time under my care, were as follows:—The patient was a married man of about twenty-seven or twenty-eight years of age. Rumination took place after all his principal meals. His appetite was always good, and his food was taken in large mouthfuls, was masticated hastily and imperfectly, and swallowed eagerly, chiefly in order to resume his avocations. There was no thirst. His bowels were habitually costive. His sleep was sound.

13. Usually rumination commenced from a quarter of an hour to an hour after a meal. At its commencement, a sense of fulness was felt at the cardia, followed by a fuller inspiration than usual. As soon as inspiration was completed, a bolus of the unchanged food rose rapidly from the stomach, during the expiratory act, or preceding this act; and so rapidly did expiration succeed to regurgitation of the alimentary bolus, that the latter appeared as part of the expiratory act. The ruminating process was never accompanied, at any time, with any degree of nausea, nor with pain or disagreeable sensation. The returned alimentary bolus was attended by no unpleasant flavour, was in no degree acidulous, was equally agreeable, and was masticated with greater plea-

sure, and much more deliberately, than when first taken.

14. The whole of the food taken at any one meal was not thus returned for remastication, only the part which had undergone this process insufficiently, and which often constituted the greater part of the aliment. That taken at the commencement of a meal was generally first disgorged; but this order was sometimes not observed, much depending upon the articles partaken of and their comparative degrees of comminution and digestibility. The more fluid portions of a meal were not always returned unless along with the more solid or imperfectly masticated parts; and it was often then observed, if a considerable time had elapsed from their deglutition, that the former was more or less acid, whilst the latter possessed the same taste and flavour as when first swallowed. When the stomach was distended suddenly by a large meal, the fluid as well as the more solid contents were generally regurgitated and again swallowed after more or less mastication.

15. In this case, as well as in the others, this affection appeared to have been partially under the control of the will; for, although it sometimes took place when the mind was merely unconscious of the process, yet it never occurred when the individual was sound asleep. If sleep supervened soon after a meal, either it was broken by the occurrence of the ruminating process, or it prevented this process, particularly if it continued for some time. In this latter case, acrid eructations, flatulence, &c. took place, owing to the gastric juices being insufficient for the imperfectly masticated ingesta. Sometimes, when the ruminating process was thus prevented, or voluntarily suppressed, the ingesta were not returned until after some hours; but were then acid, often acrid and bitter, and were occasionally regurgitated in so large a quantity as to fill, or even as more than to fill, the mouth. This, however, was unattended by cardialgia, or gastrodynia, or by any feeling of nausea; and even these disgorged matters were attempted to be remasticated, although more generally thrown out on account of their disagreeable taste. In a case related by M. CULLERIER, the subject of it ruminated only when he was urgently pressed by his occupations and ate his meals in a few minutes, with little mastication. On becoming more at leisure, and being able to pass an hour at table, he ceased to ruminate. Human rumination is to a certain degree an involuntary act, and yet the individual has certainly the power of hastening or suspending it to a certain extent.

16. *Dissections* have not thrown any light on this affection. Nor can it be expected that, even in the event of sudden death taking place in a ruminating subject, any very manifest alteration of structure would be found. FABRICIUS and BARTHOLINUS were confident of finding two stomachs at least in ruminating persons, from the analogy of the cornuted animals! PYER and MORGAGNI justly ridiculed the idea, and argued that there were animals which ruminated without a double stomach. The first instance, in which inspection after death was made was in the case of the monk already alluded to. It was made by FRANCIS PLAZZONI, and is related by RHODIUS and BONET, the former of whom states,—“*Monachus cum voluptate cibum ruminavit. Medici brutorum*

more genuino ventriculo præditum putabant. Ipso defuncto, F. PLAZZONUS oesophagum reperit undique carnosum instar musculi, reliquis universi corporis partibus se recte habentibus.” The physicians of the seventeenth century were not much enlightened by the opening of this monk, but their dreams of the existence of two stomachs were henceforth dissipated. J. P. FRANK mentions the case of an old hypochondriacal pharmacist who ruminated for forty years. He died greatly emaciated, and on dissection the pancreas was found scirrhus. In a case noticed by BONET, the only change observed after death was the very great size of the stomach and the rough or corrugated state of its villous surface.

17. III. CAUSES.—The *predisposing causes* of this affection in man are manifestly debility of the stomach with increased organic sensibility, and an insufficient secretion of the gastric juices for the quantity and state of the ingesta. The *exciting cause* is manifestly an imperfectly divided, and insufficiently masticated and insalivated condition of the more solid food, together with a too rapid distension of the stomach. Probably the former would be insufficient to excite the affection without the latter, otherwise the numerous persons who are incapable sufficiently to masticate their food, owing to the state or the want of their teeth, would be much more liable to this disorder than we find to be the case. It is not unlikely that more depends upon the state of the organic sensibility and contractility of the stomach, especially at its cardiac opening, than upon the other conditions singly now mentioned. It is most probable that, as the more digested and digestible matters are propelled towards the pylorus, the least divided or masticated aliments irritate the cardia, and thus, by a reflex action, originating in the stomach, or rather in this region of the stomach only, regurgitate or propel a portion of the unmasticated contents upwards and along the oesophagus to the mouth for their better preparation. As digestion commences and proceeds and the stomach contracts, the chyme or more altered parts are propelled to the pylorus, and the least prepared or least soluble parts are thereby placed nearer the cardia, whence they are simply regurgitated and remasticated, or where they occasion, according to the states of the organ, or the states of their preparation in the mouth, or their nature, if not rumination, partial or complete, acrid eructations or cardialgia, or any other form of indigestion.

18. IV. TREATMENT.—This affection should be treated simply as a form of indigestion, due attention being paid to the state of the biliary secretions, and indeed to all the secretions and excretions. But the means of cure will frequently fail if the patient neglect to take his meals deliberately, and masticate his food sufficiently, or if he take more than his digestive powers can duly dispose of. In the cases which occurred in my practice, a grain of ipecacuanha with a sufficient quantity of the pilula aloës cum myrrhâ, or of the extractum aloës purif. to preserve the bowels open, was given twice daily, and a tonic draught about an hour before dinner; or only the pills prescribed in the Appendix (*Form 558.*). These were aided by warm salt-water bathing, followed by frictions of the surface; by cold sea-bathing, or the cold shower-bath; by attention to diet, by eating in moderation, and by masticating deliberately. In other re-

spects, and according to the associations which this affection may present in practice, the treatment is altogether the same as is recommended in the article INDIGESTION.*

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RUPIA. — *SYNON.* — *Ulcus atonicum*, *Ecphylis Rhypia* (Good); — *Rhyparia*; *Rupia* (from ῥῆπος, filth); — *Phlyzacia*, *Alibert*; — *Atonic ulcer*.

CLASSIF. — Order 6th. Vesicular eruptions. Genus 4th. Offensive vesicular eruption (Willan and Bateman). IV. CLASS. IV. ORDER. (Author).

1. DEFIN. — *An eruption of small, flattened, and distinct bullæ, surrounded by inflamed areolæ, filled with a serous, puriform, sanious, or dark bloody fluid, and followed by thick, prominent, dark-coloured scabs, covering unhealthy ulcers.*

2. I. DESCRIPTION. — This eruption is observed chiefly in delicate, debilitated, or cachectic constitutions. It is so closely allied to *Pemphigus* as to justify the arrangement of both as species of the same genus. Most of the recent writers on diseases of the skin have described three varieties of rupia,

namely, *Rupia simplex*, *R. prominens*, and *R. escharotica*.

3. i. *Rupia simplex* commonly appears on the legs, sometimes on the loins or thighs, and seldom on other parts. It commences with one or more flattened, isolated bullæ, varying from the size of a sixpence to that of a shilling, that contain at first a transparent serous fluid, which soon becomes turbid and purulent. This fluid grows consistent, and is finally changed into scabs of a chocolate colour, thicker in their centres than in their circumferences, the outer layer being continuous with the epidermis, which appears detached at the margins by the fluid underneath. Under the scabs, which are detached within a few days, the skin is found excoriated or ulcerated superficially. The sore, if left to itself, either heals up, or is more frequently covered by another scab, which is thrown off at a later period; and thus the process may be repeated for several times. When the ulcer heals, the part retains, for a very long time, a livid or deep red hue.

4. ii. *Rupia prominens* presents larger bullæ than the preceding, and the scabs are thicker, and the ulceration underneath is deeper. Each bulla is preceded by a circular red spot, over which the cuticle is detached and slowly raised by a dark thick fluid, which soon concretes into a scab, the thickness and size of which increase for some days afterwards. The circumference of the scab is surrounded by a reddish border, a few lines in breadth, the epidermis of which is raised by a serous fluid, which forms a new incrustation, adding to the extent of that already produced. The areola also increases in breadth, around the base of the scab, which itself increases in breadth and thickness, during three or four, or even during seven or eight days. When the diameter of the scale is large it resembles the outer surface of the convex shell of an oyster; but in this variety, the incrustation projects in the same degree as it spreads, becomes conical, and resembles the shell of a limpet. The scab adheres firmly, and generally requires emollient applications to facilitate its removal. When it is removed, the surface underneath the scab appears ulcerated more or less in extent and depth. If the part remain exposed to the air, either a new crust or scab is formed, or ulceration extends more deeply and spreads until it approaches the breadth of a half-crown, or crown-piece. The ulcerated surface is pale and readily bleeds. The atonic ulcers thus produced heal very slowly; and the cicatrices which they leave retain for a long time a brownish livid hue, and are liable to break open afresh.

5. iii. *Rupia escharotica* occurs chiefly in cachectic children and infants, and occasionally in aged persons, or in adults who have suffered severely from chronic rheumatism, or constitutional syphilis. It commonly appears on the legs, the thighs, the scrotum, the abdomen, the upper part of the chest and neck; but it rarely is seen on the upper extremities. This variety, in infants, is almost, if not altogether, identical with *pemphigus infantilis* (see PEMPHIGUS, § 9.). It begins by one or two red and livid spots, over which the cuticle is soon raised, by the effusion underneath it, of a serous or sero-sanguinolent fluid. The bullæ thus formed go on increasing in an irregular manner; the serum they contain becomes turbid, and of a blackish hue; they afterwards

* SAUVAGES adduces an interesting case of human rumination which occurred in a rustic, who accelerated and promoted the ruminating process, or rather the regurgitation of his food for remastication, by pressure over the stomach. After thus promoting at will this process, and resorting to it for several years, without any detriment to his health, his Confessor admonished him against it. But rumination continuing, notwithstanding the means employed to promote it were laid aside, he was told to reject the regurgitated food. He did so for a fortnight, but he became so debilitated that he had recourse to medical aid. His physician advised him to instantly re-swallow the substances which were regurgitated, without submitting them to a second mastication, and prescribed for him tonics, stomachics and aperients; and after a few days he was freed from his rumination and all his ailments.

break, and the dermis, left exposed, appears ulcerated, softened or gangrenous, in different points. A bloody and an offensive sanies bathes the surface of the sore, the edges of which are livid, but not very painful. In infants the bullæ do not generally reach so large a size as those in adults, but they follow each other in greater numbers; the sores becoming painful, causing fever and sleeplessness, and even fatal exhaustion in the course of two or three weeks. In adults, this variety sometimes acquire the dimensions of rupia prominens, and small portions of skin and cellular substance often sphacelate, and are detached slowly from the ulcerated surfaces. In every instance cicatrization is tardy, restoration being often arrested or stationary for a time. This variety is always attended by marked constitutional disturbance.

6. Rupia is sometimes *complicated*. *R. simplex* is frequently associated with *ecthyma*, or with *scabies*. The other varieties are occasionally complicated with *purpura*, or with the cachexia produced by very chronic rheumatism, by constitutional syphilis, and by long-neglected disorder of the digestive, assimilating, and excreting organs.

7. II. DIAGNOSIS.—Rupia can be confounded only with *ecthyma* and *pemphigus*.—(a.) *Ecthyma* differs from rupia in being a pustular eruption from its first appearance. The highly inflamed areola surrounding the pustules, and the hardness, small size, the embedded position, and the closer adherence of the scabs, further distinguish *ecthyma*.—(b.) Rupia is distinguished from *pemphigus* by the smaller size and flatness of the bullæ; by the turbid and sanguinolent contents, as contrasted with the usually limpid and transparent fluid of *pemphigus*; by the thick, rugous, and imbricated scabs; and by the ulcerations of various extent and depth.

8. III. CAUSES.—Scrofulous children; the offspring of debilitated, drunken or dissipated parents; and persons who have been weakened or exhausted by depressing causes, by sickness and unwholesome food, are the most frequently the subjects of this eruption. It appears, especially during the winter, amongst the insufficiently clothed and fed, and among those who neglect personal cleanliness, and who live in low cellars, or in close, crowded, and ill-ventilated places or apartments. It is also liable to occur during convalescence from small-pox, scarlatina, measles, &c.; and in both young and aged, who are the subjects of some degree of anæmia in connection with impaired excretion. Its association with cachexia, especially as an effect of this state of the frame, and of constitutional syphilis, in some other instances, is a circumstance of great importance in forming our intentions, and in selecting our means of cure.

9. IV. PROGNOSIS.—Rupia is not in itself a dangerous, although often an obstinate, and, when the eruption is abundant, a serious disease. When it appears on the legs, the ulcers are always intractable. The duration of rupia cannot be stated with precision; but it is always chronic, and often very protracted; much, however, depends upon the age and constitution of the patient; the number, the size, and the situation of the bullæ; on the states of the consequent sores; upon the character and amount of the constitutional disorder; or of the cachectic taint, or of existing visceral disease when this is present.

10. V. TREATMENT.—The intentions of cure are *first* to improve the state of constitutional power, by suitable diet, regimen and medicines; and *next* to improve the state of the ulcerated parts.—(a.) The various remote causes should be removed; and the excreting functions of the skin and the assimilating actions promoted by means of warm, or warm salt-water, or alkaline baths; by a generous, nutritious and digestible diet; by a fresh, dry air; by tonic decoctions or infusions, as those of cinchona, cascarilla, gentian, absinthium, &c., with alkalies, or with the nitro-muriatic acids; and by the preparations of iron, when indications of anæmia are observed. But, whilst these objects are pursued, the alvine secretions and excretions ought to be promoted by stomachic aperients; or by a combination of mild purgatives with tonics, or vegetable bitters, or other restoratives. If these means should fail, a course of the cod-liver oil should be prescribed, as I have lately found it successful in two obstinate cases. When this eruption appears in children, the health, and state of the milk, of the nurse require attention. A healthy nurse should be selected for the child, and change of air recommended if this may be accomplished. When rupia occurs during or after weaning, a nutritious and wholesome diet should be prescribed, and asses' milk, diluted, or fresh whey allowed for drink; but change of air, especially to a dry and open situation, or to the sea-coast, ought to be most strenuously insisted upon.

11. (b.) The local treatment of rupia consists chiefly of puncturing the bullæ early, and allowing the morbid secretion to escape, and of having recourse to such applications as will exclude the air and restore the healthy action and tone of the vessels of the part. When the scab is formed over the sore, with the natural intention of protecting diseased surface from the action of the air, then the morbid secretion thereby confined underneath or around the scab perpetuates the irritation, and the healing process is prevented. Hence the necessity of having recourse to such applications as will at the same time exclude the air and restore the healthy state of the parts. The water dressing, by excluding the air, is beneficial, as well as by allowing the immediate escape of the irritating secretion from the surface of the sore; but it does not restore the tone of the affected vessels. Strappings, isinglass plasters, and similar means, do not allow the escape of the irritating secretion, and hence, if not often renewed, they fail of being of service. But when frequently renewed, after the parts are stimulated by suitable application, they are then very beneficial. Lotions containing the nitrate of silver, or nitric acid, or the bichloride of mercury, or tincture of iodine, or the sulphate of zinc, or alum; or sponging the surface with spirits of turpentine; or ointments containing either of the balsams, especially the balsam of Peru, or one of the turpentine, are generally of service. Biett recommends an ointment containing the proto-ioduret of mercury (3j to an ounce), or deuto-ioduret (gs. xii. to 3j). Rayer, advises the surface of the ulcers to be dusted with cream of tartar. A cretaceous powder, containing the oxide of zinc, is preferable to this. An ointment consisting of one-third or a half-part of the unguent. hydrarg. oxido-nitricum is often of service.

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SALIVATION. — See *Mercurial Salivation*, and other forms of *Salivation* in art. POISONS, § 580. et seq.

SCABIES. — See ITCH.

SCARLATINA RHEUMATICA. — *SYNON.* — *Febris Exanthematica articularis*; *Exanthesis Arthrosia*; *Plantaria*; *Dengue*; *Demga*; *Febris peculiaris epidemica*; — *Giraffe*, *Bouquet*, *Fr.*; — *Dandy*; — *Eruptive articular fever*; *Epidemic eruptive rheumatism*, *Cock*; — *Epidemic anamolous disease*, *Stedman*; — *Peculiar epidemic fever*.

CLASSIF. — III. CLASS. III. ORDER. (*Author*).

1. DEFIN. — *Severe pain commencing suddenly in the small joints, followed by local swellings and chilliness, or shiverings; to these succeed heat of skin, intense pain in the head and eye-balls, which soon become general; and on the third or fourth day a scarlet efflorescence appears on the palms of the hands, spreads rapidly over the body, and continues two or three days, after which the symptoms subside; the malady being infectious and epidemic.*

2. The epidemic fever, which has been variously named, but which may be justly called an *eruptive articular fever*, or *eruptive arthritic fever*, has been somewhat differently described, and probably it has presented modifications with the climate, season, locality, and circumstances in which it appeared, and with the treatment prescribed for it. But wherever it has occurred it has prevailed almost universally, few persons having been exempt from it. It has, in every place, however, presented distinct characters which constitute it a disease *sui generis* — different from others in combining an exanthematous eruption, ushered in by fever, with most severe rheumatic or neuralgic symptoms, — the course of the malady being so divided by intervals or remissions, as often to give rise to the idea of relapses having been a common feature in its progress. The first account of its existence was brought from Rangoon in the East Indies, in May 1824; and it appeared in Calcutta in June. It extended in various directions to the different presidencies. Dr. *MOUAT* states, that it prevailed not only in Berhampore, but in many other places in the vicinity, in March, April, and May 1825. The secretary of the Medical and Physical Society in Calcutta says, that it was particularly severe in the populous towns of Patna, Benares, Chunarghur, and numerous other places. Dr. *MOUAT* describes it as “an epidemic fever,” which was characterised by “the suddenness of its attack, the redness and watering of the eyes, the acute pain in all the joints, rendered excruciating on the slightest touch, the scarlet or crimson efflorescence on the surface, and its sparing neither age, sex, nor habit of body.” The accounts furnished by the East Indian physicians of the symptoms and treatment of this epidemic fever, agree in the essential characters, but are desultory, and very imperfect in many respects, and are mixed up with speculations, as usual, as to the influence of too much rain, or of too little rain, of electrical conditions, of terres-

trial emanations, and of other supposititious causes in producing it, whilst the most obvious and true cause is entirely overlooked. The physicians who have written from their experience of the epidemic in the West Indies and North America, two years after the prevalence of it in the East, have given the fullest account of its symptoms and treatment, but without being acquainted with its previous appearance in the East Indies.

3. This disease made its appearance in the Island of St. Thomas, in the West Indies, in September 1827, and soon extended to the rest of these islands and to the southern states of America. It advanced westward among the islands during the winter, and spread to the ports on the Gulf of Mexico. Thence it travelled northwards, and reached New Orleans in the ensuing spring. During the summer Savannah and Charleston were severely visited by it. A few cases of it appeared in Philadelphia and New York; but it did not extend farther north. It has been described by the several writers referred to hereafter, but with much difference in many particulars; and it does not clearly appear whether or no the difference was owing to the influence of climate and locality, or to the treatment adopted by the writers. Dr. *STEDMAN*, who practised in the Island of St. Thomas, where it first appeared, and Dr. *DICKSON* of Charleston, have given good descriptions of it. The former states, that of a population of 12,000 in the principal town of St. Thomas, scarcely one escaped. It appeared so suddenly, and spread so rapidly, as to have caused great alarm; but it soon was discovered that although a most painful, it was not a dangerous malady; yet it often left much suffering, and even disease, after the decline of the more severe symptoms.

4. I. DESCRIPTION. — Dr. *STEDMAN* divides the course of the disease into *three stages*. — (*a.*) In the *first*, the invasion was somewhat different in different cases. Usually a person in perfect health was suddenly affected with stiffness and pain in one finger, commonly the little finger. The stiffness and pain increased and extended up the hand, along the arm to the shoulder. The fingers of both hands became swollen, stiff, and very painful, and incapable of being bent. Sometimes the affection commenced in the lower extremities, always in the small joints, and extending to the large, and to the trunk. These symptoms were followed in a short time by restlessness, depression of spirits, by nausea, in some cases by vomiting, and by chilliness or shivering. But Dr. *DICKSON* states, that shivering was either slight or wanting in the disease, as it prevailed in Charleston. To these succeeded fever, with great heat of skin, intense headach, acute pain in the back, knees, ankles, and in every joint, with violent pain in the eye-balls, which felt to the patient as too large for their sockets. In some cases, whilst the extremities were cold at first, the rest of the body was intensely hot. As the fever and heat of skin were developed, the whole body, particularly the head, eyes, back, and joints were racked with pain. In some, the features were swollen and distorted, especially the eye-lids; in others, with swelling of the face and distortion of the fingers, soreness of the mouth or pyalism occurred. Patients often complained in this stage, as well as in those which followed, of a feeling of great cold, even when the skin was very hot to the touch. When Dr.

STEDMAN had the disease, he covered himself with three blankets, although the weather was sultry at the time. The severe pains, restlessness, and nausea, rendered this stage the most distressing of any form of fever, excepting rheumatic fever. These symptoms generally continued with more or less severity for twenty-four or thirty-six hours. The fever then abated, and with it also the pains. The patient, however, continued in a state of languor, irritability, and restlessness for three days, but without fever; and generally without hunger, thirst, and altogether without taste, the tongue being loaded, and the mouth presenting small aphthous sores. The pulse was in this stage much accelerated, the urine high-coloured, and the bowels confined.

5. (b.) The *second or eruptive stage* commenced the third or fourth day after the primary fever, generally the third, with a return of fever; and with an efflorescence which appeared on the hands and feet, and rapidly spread over the body. This eruption is differently described, both as to its characters and time of appearance; and probably it was modified in different cases; but in this, as in other respects, the descriptions are loose, devoid of scientific precision, and by no means creditable to the writers. Dr. STEDMAN describes the eruption as that of “a *blotch or wheal* of red-coloured skin, between that of scarlet fever and that of measles.” Others state the eruption to resemble that of scarlet fever; others that of measles, some that of roseola or erythema, and some the nettle-rash. It was attended, “in the severer cases, by swelling of the feet, hands and face, particularly the eyelids, and by a distressing tingling, which, as the eruption disappeared, became an intense itching. The efflorescence generally began to fade on the second day, and was entirely gone before the third morning of its existence. This was followed in almost every case by some degree of desquamation,” which, in a few instances, gave rise to troublesome consequences. After this eruptive stage, many patients began to recover their spirits and strength, a complete want of taste often remaining for some days; but many patients also became subject to the next stage.

6. (c.) The *third, or rheumatic stage*, sometimes immediately followed the eruptive stage, but often not until one, two, three or four weeks, or more had elapsed; and however early or late it appeared, it was generally of considerable duration, the pains and paralysis being greater than at first. “These pains were not accompanied with fever; and they generally fixed themselves in one or two joints, and continued to excruciate the patient for weeks.” They were always severest in the morning, and wore off in some degree towards evening. Some were tormented in addition by most distressing itching of the skin; and in others the joints, particularly those of the fingers, were painful, stiff, and swollen, so as to produce deformity. The secondary pains were chiefly in the fingers, toes, wrists, ankles, and knees; confined persons to their beds, and were so aggravated on motion as to call forth groans and shrieks from those who suffered this stage severely. Except these pains, and the irritation they occasioned, “no other symptom of disease remained. The appetite was good, although the sense of taste was blunted.”—“In a period varying from three to four, or six days, the pains began gradually to subside, de-

serting one joint after another until they remained fixed for some time in one. This process occupied several weeks, and was often attended by relapses.” This description, however, applies only to the severest form of the malady; endless grades of severity, as well as differences in the stages having been observed; “for while some, who underwent the primary fever with the utmost mildness, had the eruptive attack with great violence; others who had passed gently through both, and were congratulating themselves on their escape, were suddenly crippled by the secondary pains.” It was remarked, that those whose unavoidable occupations forced them to exertion, or who had resolution enough to exert themselves, got sooner rid of the pains than those who gave way to them.

7. (d.) The *differences or modifications* mentioned by those who have described the disease were numerous. Dr. STEDMAN remarks that the negroes were much less severely attacked than the white inhabitants; and yet the only three fatal cases which occurred in the island were negroes. Dr. DICKSON, of Charleston, states that excessive determination of blood to the head was frequent, and that delirium was present in several instances; but that it went off with the fever of the first stage, which did not remit, but subsided in a short time—on an average, in about thirty-six hours. The skin at this stage was at first hot and dry; but an abundant perspiration was thrown out, attended occasionally by a rash or miliary eruption. This eruption appearing in the first stage (not the characteristic eruption) was very various, and not the regular or true one. Children were often thus affected by it, and in several adults a thick crop of pimples was the first token of disorder. On the third or fourth day, little or no fever being present, the tongue became coated with a yellowish fur; the stomach uneasy or distressed; the patient low-spirited, impatient, fretful and restless at night. Frequently there were great lassitude and debility, nausea, vomiting, and a distressing feeling of oppression. About the sixth day of the disease “these symptoms were more or less relieved by the coming out of an abundant eruption, which must be regarded as an essential or characteristic part of the malady. It consisted of irregularly shaped patches, red and elevated; the feet and hands swelling with thickening and numbness. There were much itching and burning of the skin, and at this period a second febrile paroxysm often came on; and the pains of the joints were in many aggravated to their former severity.” In some cases, the first stage of the disease had passed over with very little notice or complaint, and yet in them this eruptive or second stage was very violent. “Many became sensible on the third or fourth day of an inflammation and enlargement of the glands in the groin, axilla, neck, &c. and these glands continued swollen and painful a long time after convalescence was established.”

8. Very young *children* were liable to the disease, even from a few days after birth: some were supposed to be born with it. In these the skin was of a scarlet red, and the tongue and lips smooth and fiery. The infant could not bear to be disturbed; it screamed violently when lifted or when any of its limbs were moved. Below five years of age convulsions very commonly attended

the invasion, and sometimes continued with great frequency throughout the whole of the attack. *Pregnant women* were very liable to abortion, instances of miscarriage having been numerous. They were usually seized at the very commencement with violent pains in the back and loins, extending into the thighs, occasioning the expulsion of the foetus. In old persons, the disease occasioned excessive prostration of strength; and in several of these, it left behind it an erysipelatous inflammation of one or both legs. There was often soreness of the mouth; looseness, lividness, and sponginess of the gums, with slight salivation. Ulcers sometimes formed in the mouth, which were occasionally painful, irritable, and difficult to heal. Very few died in Charleston; but the aged, the intemperate and corpulent were severely shaken by the malady, and remained long debilitated and emaciated; few persons above the age of sixty had absolutely recovered from it after two or three months from the attack.

9. II. CAUSES. — Nearly all who observed this epidemic in the western hemisphere have considered it infectious. Drs. STEDMAN and DICKSON, who have given the fullest account of it, concur in this opinion. The introduction of the disease from one island to another, and the propagation of it from persons and places to others, were so frequently and so incontrovertibly proved, that no doubt as to the fact of its infectious nature was entertained. But how did it originate? for there was nothing in the medical topography, the season, the weather, or the climate of St. Thomas, where it first appeared, in the West Indies, to account for the occurrence. Dr. STEDMAN states, in his very disjointed, although tolerably full account of the epidemic, that it was supposed to have been brought to the island by a vessel from the coast of Africa; but that this fact was not satisfactorily ascertained. Nor, indeed, does it appear, that any trouble was taken to determine the matter. Dr. DICKSON states that the disease was imported into Charleston by the captain of a ship who brought it from the Havanna and communicated it to his family; and that the transmission of the disease was traced from one subject to another. Dr. D. considered it a contagious eruptive fever; and remarked, that, in a few cases, in which the eruption in the second stage did not take place, the patient was liable to a second, third, and an indefinite number of returns of the disease, whilst those "*who were properly covered with the eruption about the sixth day were protected from any future attack.*" He states this to have been a rule to which there was no exception in his practice, and that this protection had particularly attracted his attention.

10. III. NATURE. — The descriptions which have been given of this disease show it to have been an infectious eruptive fever, *sui generis*, attended by severe arthritic, or rheumatic, or neuralgic pains, to which all were predisposed who were not protected by a previous attack. In this it agreed with scarlet fever, measles, small-pox, &c.; and with these diseases it also agreed in its specific eruption appearing at a definite stage of its progress. The eruption itself has not been described with precision; but it appeared to have more closely resembled that of scarlet fever than any other, or to have been intermediate between it and measles. It appeared to have consisted of

large scarlet blotches, which were smooth and slightly elevated, owing to the congestion of the minute sub-cuticular vessels, and which terminated in desquamation. The violent articular pains, swelling, and stiffness were evidently results of a remarkable alteration of the organic sensibility, with a consequent change of the capillary circulation in the synovial and other tissues of the joints, as well as in the vascular rete of the skin. Whilst the cutaneous eruption, occurring at a certain period, and continuing only a short time, entitles the disease to rank amongst the exanthemata, the painful state of the joints imparts to it the rheumatic character. That it was not a form of scarlet fever is shown by the severity of the rheumatic or neuralgic symptoms; by its having attacked persons who had previously had scarlet fever; by the absence of the nephritic disease and dropsy so often consequent upon scarlet fever, as well as of the internal affection so frequently complicating this fever. That it was not a rheumatic fever was shown by the undoubted propagation of it by infection, by the character and time of the appearance of the eruption, by the course of the disease, by the absence of any cardiac or other internal complication, and by the protection which a full evolution of the eruption afforded from a second attack. Dr. DICKSON doubts that this was a new disease, and believes it to have resembled a form of remittent fever observed and described by Dr. RUSH in 1780; but the differences between them are too remarkable to admit of any resemblance, and he was unacquainted with the accounts of the prevalence of the epidemic in the East, contained in the Transactions of the Medical and Physical Society of Calcutta. According to these accounts, as well as to those given of it in America, the disease appears to have possessed an asthenic character; as those who were bled, especially in large quantity, were long in recovery, although a moderate bleeding was beneficial in the plethoric or those lately arrived from Europe; and it seemed to have pursued the usual course, particularly as respected the first and second stages, whatever means were used—to have been incapable, like the other exanthemata, of being cut short by any treatment, however much its violence was mitigated—a mitigation which was best accomplished by an emetic, followed by mild purgatives and diaphoretics. The very few deaths which occurred during this epidemic appeared to have arisen either from pre-existent organic lesion, or from some coincident or intercurrent disease produced by its usual causes, and presenting no necessary connection with this malady.

11. IV. TREATMENT. — Dr. STEDMAN states that the first cases which appeared at St. Thomas were so mild that he prescribed only purgatives, the warm bath, pediluvium and diaphoretics. When the pains were severe patients refused purgatives, owing to the distress occasioned by the least motion. As the cases became more severe in the course of the epidemic he had recourse to bloodletting, during the establishment of the febrile excitement of the first stage taking away from 12 to 20 ounces, but never more, nor ever repeating the operation. After bleeding and purging he gave Dover's powder at bed-time. During the eruption he gave cooling aperients and cooling beverages, and prescribed the usual washes for the

soreness of the mouth. Dr. Cock adopted a similar plan of treatment to that of Dr. STEDMAN. Dr. DICKSON states, that he, as well as others, at first prescribed bleeding, purgatives, and warm diaphoretics; but the great severity of the pains induced him to give large doses of opium, and the relief and success following the practice induced him to persist in it and to relinquish bloodletting, as he believed that not only was the vital fluid thus husbanded, but the subsequent sufferings were lessened in severity and duration. He considered that, beyond the preservation of an open state of the bowels, cathartics effected very little benefit; and that an emetic was less objectionable, but was in most instances unnecessary. In addition to a free recourse to opium he employed camphor, æther, and sinapisms externally. Restoratives appeared to have been required at an advanced stage of the disease, especially in aged and delicate persons.

12. In the East Indies, the softness of the pulse and the general depression deterred many medical men from bleeding from a vein; but some had recourse to the application of leeches, and others considered that bleeding in any form was prejudicial. The most successful practice appears to have consisted of the administration of an active emetic, followed by purgatives so as to freely evacuate the bowels; and these by opiates or anodynes with diaphoretics; restoratives and tonics having been given after the subsidence of the eruption of the second stage.

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SCARLET FEVER. — SYNON. — *Scarlatina* (from the Italian, *Scarlatto*, scarlet, a deep red), Sauvages, Vogel, Juncker, Cullen, J. P. Frank; — *Morbilli confluentes*, *M. ignei*; *Rubeola confuens*; *Febris purpurata*; *Rosalia*, *Rossalia*, *R. squamosa*, Auct.; — *Morbus scarlatinus*; *Febris scarlatina*; *Febris scarlatina*, Sydenham; — *Purpura scarlatina*, Burserius; — *Gutteris morbus epidemicus Foresti*; *Febris rubra*, Heberden; — *Typhus scarlatinus*, Crichton; — *Typhus scarlatina*, Young; — *Exanthesis rosalia*, Good; — *Febris scarlatino-miliaris anginosa*; *Porphyrimus*; — *Porphyrisma*, Ploucquet; — *Fièvre rouge*, *F. pourprée*, Fr.; — *Scharlach*, *Scharlachfieber*, *Scharlachkrankheit*,

Scharlachaußschlag, Germ.; — *Scarlattina*, Ital.; — *Scarlet fever*, *Rash fever*.

CLASSIF. — 1st CLASS, Febrile Diseases; — 3d Order, Eruptive Fevers (Cullen): — 3d CLASS, Diseases of the sanguineous Function; — 3d Order, Eruptive Fevers (Good). — III. CLASS. III. ORDER (*Author in Preface*).

1. DEFIN. — *An infectious continued fever; on the second day of which, or sometimes later, a scarlet efflorescence generally appears on the fauces and pharynx, and on the face and neck, spreads over the body, and commonly terminates in desquamation from the fifth to the seventh day; the fever being accompanied with affection of the kidneys, often with severe disease of the throat, or of some internal organ, and sometimes followed by dropsy, and occurring only once during life.*

2. There is reason to doubt that the Greeks and Romans were acquainted with this disease, and the doubt applies equally to the Arabians, although a few passages in RHAZES might support the idea that scarlatina was confounded by the Arabian writers with measles. The first writer who distinguished the disease is stated by HILDENBRAND and J. FRANK to have been INGRASSIAS, who remarks that before the period at which he wrote it was called *Rossalia* or *Rossania*, from rosso, red; and that, although it was generally considered as the same malady as measles, yet he was convinced, by his own observations, that the one was different from the other. J. COYTAR, a physician of Poitiers, published an account of an epidemic which prevailed in 1557, having the characters of this malady; and FORESTUS states, that the epidemic at Amsterdam in 1517, described by TYENGIUS, was this malady. According to WIERIUS and SCHENK, this fever appears to have been prevalent in Lower Germany in 1564 and 1565; and BALLONIUS states that it was epidemic in Paris in 1581. DE HEREDIA describes it by the appellation of "*Angina maligna*." The disease which was epidemic in Naples in 1620, and of which accounts were published by CARNEVALA, NOLA, and SGAMBARTI, was probably scarlatina anginosa, which was then variously denominated, but most frequently as "epidemic phlegmonous angina," "a pestilential affection of the fauces," &c., although HILDENBRAND entertains a different opinion. From this period accounts of several epidemics of scarlatina were furnished by writers, the symptoms and characters of which appear to have varied then as in more recent times. D. SENNERT was the first to give a true description of scarlatina, in 1619. Subsequently WINKLER, in 1642, WELSCH of Leipsic, and SCHULZE in Poland, observed severe epidemics of this malady, and described it by the name of "malignant purpura," by which it was then known. The epidemic described by SYDENHAM, from 1667–73, appears to have been comparatively mild; whilst that observed by MORTON, from 1672 to 1686, seems to have been much more severe; but he has noticed it as differing from measles, chiefly as respects the character of the eruption. During the eighteenth century this malady became more and more frequent, and the general prevalence and the great fatality of its epidemic visitations roused medical attention to its nature and treatment. STORCH, HUXHAM, STOERK, FOTHERGILL, HEBERDEN, DE HAEN, BICKER, BLACKBURNE, GRANT, SACHSE,

KREYSIG, WITHERING, REUSS, and many others, have described these visitations. During the early part and middle of that century, scarlet fever was variously named, and not only distinguished from other diseases attended by efflorescence, but more especially from measles and roseola. The writings of HEBERDEN and FOTHERGILL in this country were the first to show the distinct nature of this malady; and those of WITHERING placed this fact beyond dispute. At the present day scarlet fever is never absent, either in a sporadic or epidemic form, from any country in Europe, although in different degrees of severity and of prevalence. In warmer countries it appears chiefly as an epidemic, and generally after considerable intervals of immunity from its devastation.

3. I. DESCRIPTION OF REGULAR OR NORMAL SCARLATINA. — The *course* of scarlatina has been divided into *three periods*, or stages, by some writers, and into *four* by others; these latter dividing the second stage into two. 1st, That of invasion, or that preceding the eruption;—2d, That of the eruption (comprising the periods of eruption and of efflorescence);—and, 3d, The stage of desquamation. When scarlet fever proceeds in its more regular or usual course, these periods are generally very distinct; but when it assumes certain varieties, forms, or complications hereafter to be noticed, they are often indistinct, or even not altogether observed.

4. A. The *first stage* of regular or normal scarlatina — *stadium invasionis, s. irritationis* — is attended by general uneasiness, lassitude, headach, or giddiness; by a sense of depression, and loss of strength. The patient dislikes food, nauseates animal food, and complains of chills, horripilations, shiverings, or rigors. These are succeeded by heat of skin; great acceleration of pulse; by urgent thirst; by increased headach; by pain and redness in the throat, with difficulty of swallowing. The eyes are often red, and intolerant of light. These symptoms are the most constantly observed; but in severer cases nausea, vomiting, violent pain in the head, with aching of the back and limbs; augmented sensibility, sleeplessness, occasionally delirium, or even convulsions, in very young subjects, are also observed. Fever is always present, although often slight; and either exists alone, or precedes or accompanies the angina. It is often severe, the pulse being very rapid and full, the skin dry and burning, and the face congested, tumid, or slightly suffused. The redness of the fauces and pharynx is frequently great on the first day, sometimes in the course of a few hours, and the tonsils are swollen. The redness and congestion sometimes extends to the posterior nares, causing a stuffing sensation in the nostrils, and occasionally there is hoarseness. The tongue is covered at its base with a whitish or yellowish coating, is red at its edges and point, and its papillæ are erect or excited. The bowels are costive, or irregular; and the urine is scanty, high-coloured, voided frequently, and is sometimes albuminous, or soon afterwards presents these characters. In most cases these precursory symptoms continue but one day; in others they are prolonged, the eruption not appearing until the third or even the fourth day: in some the febrile symptoms are either so slight as not to attract attention, or are so instantaneous and brief as to appear as if merely ushering in the angina or efflores-

cence. The perspiration possesses a peculiar odour, which has been variously described by HEIM and others.

5. B. The *second stage* commences with the eruption, which appears generally about the second day, — sometimes on the evening or night of the first day, and occasionally not until the third, or even fourth day. The efflorescence appears first on the neck and face, especially the cheeks, the tint of which is commonly deeper than that of other parts of the countenance. Sometimes the chest or trunk, or the extremities, or even the hands and feet, first exhibit the eruption, which extends more or less over the body. The eruption consists of an infinite number of minute red points, which appear in a rose-coloured ground, and are not visibly or sensibly elevated. These points, which are finer, redder, more regular, and more confluent than those of measles, are transformed into patches, which are not elevated, and appear smooth or continuous with the surrounding surface. The patches, at first distinct, enlarge, and thus coalesce; ultimately imparting a scarlet tint to the skin, which disappears momentarily from the pressure of the finger. The skin is now very hot, dry, and somewhat rough to the touch. It is sometimes diffusely tumefied, from the cutaneous and sub-cutaneous congestion, especially in the neck, face, feet, hands, and flexures of the joints; and is often the seat of a disagreeable stinging or pruritus.

6. The redness of the fauces and pharynx, and the swelling of the tonsils and adjoining glands, are now considerable, often occasioning occlusion of the throat, and, externally, more or less tumefaction. The swollen tonsils are covered by a thin, soft, and whitish exudation of lymph. The tongue sometimes retains its coating, but as frequently it is gradually deprived of it from the edges to the middle, and it then presents a deep red hue, and appears so smooth as if varnished: occasionally the elevation of the papillæ gives it a strawberry appearance. About the third or fourth day the eruption has reached its height. It is usually most vivid about the groins, the insides of the thighs and lower parts of the abdomen, and on the inner flexures of the joints; and it continues the longest in these situations. It is redder during any excitement, or when the child cries; and is paler in the morning, and deeper in the evening and night, when the fever is highest. The redness of the skin, at its greatest pitch, has been likened by P. FRANK and others to that of a boiled lobster, and by others to scarlet cloth. It is the most continuous, general, and deep in the most severe cases, and when the febrile symptoms are the most acute. The skin is remarkably hot, varying from 104° to 108° of Fahrenheit's scale; but not so hot as reckoned by CURRIE.

7. During the eruption, the countenance expresses anxiety and suffering when the disease is thus severe. The eyes are animated and brilliant; delirium and restlessness often occur at night; and a sleeplessness, which resists the usual means of procuring rest, is caused by the heat and stinging of the surface, and the affection of the throat. This affection is sometimes so severe, the swelling of the subjacent cellular tissue, and the exudation of soft lymph from the inflamed surface of the tonsils, fauces, and pharynx so considerable, and the secretion from the salivary glands so viscid

and scanty, as to materially increase the distress of the patient. Thirst is now urgent; respiration is accelerated, somewhat difficult and laboured, and the breath is hot. The pulse is very rapid, full, broad, and compressible. In some cases slight sopor is observed; in others a sense of sinking is felt. The bowels are generally costive; but a slight diarrhoea occasionally supervenes, with colicky pains. The urine is scanty, frequently voided, and high-coloured, sometimes albuminous. The patient exhales the peculiar odour already noticed, which is difficult to be described, although readily recognised by the experienced observer. After five, six, or eight days' duration—generally after a longer period than in measles—the efflorescence fades; at first assuming a violent tint, and afterwards a pale rose or coppery hue. Generally the mucous membrane of the mouth and throat continues still red; and often it is not until now that the tongue is deprived of its coating, and shows its characteristic redness and prominent papillæ. The swelling about the neck and throat now diminishes, and the next stage supervenes.

8. C. The *third stage*, or that of *desquamation*, commences at various periods, in the different forms and complications of the disease; and even in the more regular type it varies remarkably as to the time of its occurrence. If the fever and eruption are slight, desquamation may follow the fourth or fifth day. If both the fever and the eruption are intense, it generally is not observed until after the seventh day, or not until the eighth or ninth. With the subsidence of the fever and of the redness of the surface, the furfuraceous desquamation commences. Occasionally this change is ushered in by a slight perturbation or exacerbation of the various febrile symptoms, followed by slight diarrhoea, or by epistaxis, or by the catamenia in adult females, or by a copious discharge of turbid urine, depositing a whitish or rose-coloured sediment; or by a free perspiration, having a strong and peculiar odour. The affection of the throat in this regular type of the malady becomes less severe; although, in some cases, it is not ameliorated until a later period; and the external swelling continues somewhat longer, the internal exudations still remaining, or proceeding for a short time. The pulse evinces less irritative excitement; is less full, less quick, but still accelerated, and soft or weak. The tongue is clean, but red and flabby; and it does not regain its natural hue until after the guttural affection is removed. As desquamation proceeds, the surface becomes paler; the epidermis exfoliating in small furfuraceous whitish scales on the trunk of the body, and in large scales or lamellæ where the epidermis is thicker, as in the extremities, and in the hands and feet. With the desquamation the function of cutaneous transpiration is gradually restored, and convalescence commences. But the pulse often continues accelerated or weak, or very compressible; the urine sometimes albuminous, or the bowels disordered; and convalescence becomes interrupted, delayed, or entirely arrested by some serious consecutive affection hereafter to be mentioned, and which should be anticipated and guarded against. In some instances, the desquamation does not occur for several days after the redness of the skin has disappeared, or not until a fortnight or

three weeks have elapsed; but it usually follows the same order as that observed by the progress of the eruption.

9. II. OF THE TYPES AND IRREGULAR FORMS AND COMPLICATIONS OF SCARLET FEVER.—The *types, forms, or varieties of scarlatina* vary remarkably, not only in individual sporadic cases, but even in different persons of the same family in the same epidemic. The forms are remarkably modified as respects—1st, The characters and duration of the eruption;—2d, The type or character of the constitutional affection—the nature of the fever;—3d, The seat and nature of the complication;—and, 4th, The nature and prevalence of the sequelæ, reliquæ, or consecutive diseases. The irregularities, or anomalous forms (as they have been usually termed) of this malady require a much more serious attention than the more regular states; for these latter are not more frequently met with than the former, and are seldom attended with danger, unless they are neglected or mismanaged; whilst the former are for many years the most prevalent forms of the disease, and are much more frequently attended by danger—sometimes the most imminent danger—as regards either their invasion and progress, or their sequelæ. Like measles, but still more remarkably than that malady, scarlet fever presents the utmost diversity of form, severity and complication—a diversity depending upon epidemic constitution, upon local or endemic causes, upon the accumulation of morbid exhalations, and upon undue crowding and the absence of sufficient ventilation.

10. Of these several circumstances tending to modify the nature and form, or to extend or limit the prevalence, or to complicate the character of scarlet fever, there is none more influential than the prevailing *epidemic constitution*—the “*Constitutio morborum stationaria*,” first insisted upon by SYDENHAM, and recently by AUTENREITH, and by one of our best and most practical writers, Dr. GRAVES. There is no kind of fever which displays a greater diversity in its nature and complications, according to the prevailing epidemic constitution, than scarlet fever, or which manifests the character of such constitution more remarkably than it. Upon whatever cause this stationary epidemic constitution may depend—whether or not it may be connected with the long prevalence of dry, or of wet, or of cold, or of hot seasons, either of which has been observed to occur for several years in succession, giving rise accordingly to either inflammatory, or adynamic, or gastric, or other forms of the malady,—or whether or not it may be aided by prevailing states of the electricities influenced by these conditions of the seasons,—there can be no doubt of its influence,—an influence which has been duly recognised by those whose experience has been of sufficient duration to have observed the changes of those epidemic constitutions, or whose learning has made them acquainted with the experience of other observers. The *forms and complications* of the disease, therefore, which will require an especial notice at this place, are, 1st, those which respect more particularly the appearances of the eruption;—2d, those which consist chiefly of the state of vascular action and vital power;—and 3d, those predominant affections which arise either in the course of the disease, or as a consequence or consequela of it.

11. i. THE APPEARANCES OF THE ERUPTION OR

efflorescence are always deserving of attention, for the purpose not only of diagnosis, but also of furnishing indication of the state of vital power.—

A. The eruption may be *partial*; in this case it is observed chiefly in the neck or chest, or on the trunk, or on the flexures of the joints, or on other parts, in the form of red patches, of variable extension. Sometimes the redness is excessive, deep, and extensive, or general; at other times it is slight or pale. Frequently redness is uniform throughout. Occasionally a number of small violet-coloured points are dispersed through the reddened ground; these points differing, however, from the punctuated form of eruption. In some cases a miliary eruption—or miliary vesicles—the *scarlatina miliformis* of P. FRANK—more or less abundant, appear at the commencement, more frequently than at the decline of the efflorescence, and are found most frequently on the neck and chest, and on the insides of the thighs and arms. These vesicles are sometimes interspersed with sudamina, or with papulæ, but very rarely with true pustules. Owing to the existence of these secondary or intercurrent eruptions, scarlatina has been termed *miliformis*, or *papulosa*, or *phlyctenosa*. These irregularities are not indications of any departure from the usual course of the disease, nor of an unfavourable result.

12. REUSS, RAIMANN, and HILDENBRAND have observed, in rare instances, the eruption on the second day of the efflorescence, of *bullæ* of a dark red colour, above the size of a nut, containing a yellowish serum, and resembling that produced by a blistering plaster. The cuticle breaks, and, the fluid being discharged, a sore remains, which follows the course of the constitutional malady—*scarlatina pemphigodes*, HILDENBRAND. The few cases in which this state of eruption has been observed, have been characterised by a remarkable degree of heat of skin, with a disposition to a septic or putrid condition. The only instance in which I observed this appearance of the eruption was that of a man of middle age, referred to hereafter, who accidentally allowed the discharge from the throat of his child shortly before death from malignant scarlatina, to remain on parts with which it had come in contact for some time. In the more malignant or dangerous states of this fever, the eruption assumes a deep, or dark, or livid appearance, or an almost violet tint; the darkness of the hue being great generally in proportion to the malignancy or putro-adyndamia characterising the malady—to the depression of vital power, and to the change in the blood. In some of these cases, petechiæ or ecchymoses are found more or less abundantly interspersed in the deep red, or livid surface. In rarer instances the skin exhibits, in patches, altered dark blood effused between its layers—*Scarlatinal purpura*. This hæmorrhagic tendency, arising from extreme deficiency of vital power in connection with a poisoned or altered state of the blood, in which the fibrine has lost its power of vital cohesion, is remarkable in some epidemics, especially in those of a malignant or putro-adyndamic character.

13. B. Besides irregularities in the form and appearances, the eruption may be abnormal in its *course* and *duration*. It may be long in appearing, the fever continuing three, four, or five days before any eruption breaks out. This not infrequently occurs in the more dangerous and com-

plicated cases. On other occasions the eruption is remarkably early, especially in very favourable cases, when it sometimes almost immediately follows the fever, the symptoms of which may be so slight as to escape detection, or may be masked by some antecedent or existing affection. The efflorescence, having made its distinct or early appearance, may either disappear prematurely or suddenly, or it may continue an unusually long time. The *retrocession* of the eruption may be occasioned by cold or by an internal complication, or intercurrent affection. Occasionally the eruption disappears on the first or second day, and reappears again, after two, three, or more days. In rare cases, I have observed it continue nearly its usual time, and reappear after seven or eight days, and then proceed the usual course. In other cases, the efflorescence comes out freely, then fades, and soon afterwards is again abundant, thus assuming a remittent form, the remissions appearing chiefly on alternate days, the eruption being most abundant when the febrile action is highest. The eruption may, moreover, be of unusually long duration—may be prolonged to the ninth or tenth day. This is most apt to occur when it is general and intense; the persistence being longest in the extremities.

14. C. The *absence of eruption* in true scarlet fever has been doubted; but has been admitted by HUXHAM, FOTHERGILL, AASKOW, STOLL, BANG, RANOE, RUMSEY, DANCE, GUERSANT, TROUSSEAU, BERTON, and others. The circumstance of individuals having the constitutional affection, either with or without sore-throat, during the epidemic prevalence of the disease, and the existence of it amongst the other members of the same family, in its more usual forms, are proofs of this affection being actually scarlet fever, although unaccompanied with eruption; and the propagation of the malady from cases of non-eruptive scarlatina, further confirms this opinion. Some epidemics are remarkable for the number of cases in which the eruption is not observed, the disease being characterised by the other usual symptoms, especially by the sore throat, by the appearances of the mouth and tongue, occasionally by the desquamation of the cuticle, especially in adults; and by consecutive dropsy, these cases communicating the eruptive disease. Sometimes, however, the eruption appears in so slight, partial, or evanescent a form as to escape observation. In these cases, the state of the mouth, fauces, and throat, and the constitutional affection, are the chief proofs of the presence of this malady, especially when viewed in connection with the prevalence of it in the vicinity, or in the same house or family. It should not, however, be overlooked, that sore-throat with fever, both the local and constitutional affections being characterised by remarkable asthenia, amounting even to putro-adyndamia, may occur sporadically or endemically, or even epidemically, independently of any connection with scarlatina, and amongst persons and families who have already been the subjects of scarlatina. Of these occurrences I have met with several instances, the greater part of a family, all of which had previously had scarlet fever, having been thus attacked. (See art. THROAT.)

15. But a child in the same house or family in which scarlet fever is unequivocally present, may have the constitutional affection, not only without

the characteristic eruption, but even without the sore-throat also; both these essential features of the malady being either entirely wanting, or so slight, or so evanescent as to escape detection. Is the fever which is alone present—without the usual local affection—truly scarlet fever in these cases; and is it, admitting the affirmative, capable of propagating the true and characteristic form of that disease?—That the fever—the constitutional affection—is scarlet fever, notwithstanding the absence of the eruption and of the sore-throat, I believe for the following reasons, namely—1st, its occurrence in individual members of a family, the rest of which are about or near the same time the subjects of scarlatina;—2d, its occasional complication with the internal affections, sometimes complicating scarlatina;—and 3d, the very frequent appearance, in these cases, of renal affection, of albuminous urine and consecutive dropsy or inflammation. This form of the disease may be justly called *latent scarlet fever*.

16. ii. THE FORMS OF SCARLET FEVER DEPENDING UPON THE STATES OF VITAL POWER AND VASCULAR ACTION.—*Upon the type or character of the constitutional affection.*—It is of the utmost importance to estimate, with tolerable accuracy, the states of constitutional disturbance existing in individual cases, and constituting in the aggregate of cases the prevailing epidemic character. In no disease is more discrimination requisite than in this, in determining both its type or diathesis, and the nature of its existing complications; and, as to none besides has more misconception existed, or has more false and mischievous doctrines been promulgated. “The blind have too often attempted to lead the blind;” and the credulous and docile many have submitted to the guidance of those who formed and promulgated their opinions from insufficient experience, or from an acquaintance with a single epidemic only, and who, estimating with as little modesty as accuracy their own opinions, denounced or ridiculed the greater experience and the juster views of their enlightened predecessors and contemporaries.

17. The *constitutional character* of scarlet fever is dependent upon several circumstances which are fully stated hereafter; and which combine to produce the pathological condition observed even in sporadic and mild, although most remarkably in extensive and fatal prevalences of the malady. The states of season, weather, and stationary and prevailing epidemic constitutions; animal exhalations, putrid effluvia, and every form of malaria, especially when aided by warmth, humidity, and imperfect ventilation; and crowded, low, or close habitations, are the chief causes of the several dangerous constitutional forms and complications which the disease assumes—causes, however, existing in intimate connection with the concentration or dose of the poisonous emanation—of the specific animal poison, and with the states of vital power, or resistance of the infected. The combinations, conditions, and operations of these causes, are especially concerned in the epidemic occurrences of the more malignant types or states of the disease which are to be particularised in the sequel.

18. A. SCARLATINA MITIS.—*S. simplex.*—*Mild or simple scarlet fever* may prevail either in a particular district, or season, or still more extensively, and for several seasons. It may even be the most general form of an epidemic during suc-

cessive seasons. It is met with in all circumstances, and seasons, and even in some of the members of the same family, in which malignant and complicated cases exist; and in the regular form above described; the disease being characterised chiefly by the mild or moderate degree of fever; by the efflorescence which generally appears early, or on the second and third day, and disappears with desquamation of the cuticle, from the fifth to the seventh; and by the slight affection of the mouth and throat, which, in many cases, is but little complained of, although, on inspection, the edges of the tongue, the fauces, pharynx, and Schneiderian membrane and internal surface of the eyelids present more or less redness. However mild the constitutional affection, or slight the affection of the throat, and however free from internal complication the complaint may be during its course, nevertheless the sequela may be serious, but chiefly as respects the disorder of the kidneys and the consecutive dropsy. Indeed, when very slight or mild attacks occur during the more severe or malignant prevalences of the malady, then these mild cases are the most apt to be followed by dropsy, unless the treatment during convalescence be most judicious, and even although the requisite care be taken.

19. B. SCARLATINA ANGINOSA.—*S. inflammatoria*, HILDENBRAND and NAUMANN.—This variety presents every phase from the mild to the malignant, and the most varied and serious complications. In this the fever is generally severe or intense, even before the eruption appears, and is ushered in by rigors, stiffness, and soreness of the throat, by intense redness of the fauces and pharynx, and painful deglutition. The tonsils are swollen, and a viscid secretion from the salivary glands, and mucous follicles, adhere to the inflamed surface, with patches of lymph of a greyish or whitish-grey hue, which cover the tonsils and pharynx, and often also the fauces, but very rarely the larynx. The papillæ of the tongue are enlarged and rise through the whitish or yellowish-white fur or mucus. The eruption is generally delayed to the third or fourth day; but it occasionally appears earlier, or even as early as the first day; then subsides prematurely, and not returns; or it re-appears in various grades; or continues with great and general intensity even beyond the usual period. These irregularities of the eruption depend much upon the nature and severity of the internal complication when this exists, and upon the violence of the fever, which is often greatest on the second or third day. The heat of the skin is then very remarkable, varying generally from 104 to 108. Thirst is urgent; the pulse is very much accelerated, full, and strong, but not hard or constricted. The affection of the throat is now severe, and the swelling so great as to impede or even prevent deglutition. The inflammation frequently extends along the Eustachian tube to the ears. The fever is aggravated towards evening and night, and delirium then supervenes. During the third or fourth day, especially if the eruption fades or suddenly disappears, some internal complication of an inflammatory nature frequently occurs; or an internal affection of an inflammatory or actively congestive kind may have commenced with the appearance of the sore throat, or with the febrile action, and have entirely prevented or delayed, or rendered irregular, the

eruption. In some of these a dark efflorescence continues for three or four days, or even longer, on the backs of the hands, and on the legs and feet. In this state of the disease, internal complications are frequent; the gastro-enteric mucous surface, or the membranes of the brain, or the lungs, or pleura, or even the pericardium, or the peritoneum, evincing a predominance of morbid action; the kidneys being also more or less implicated, although not so manifestly as during convalescence. The patient has complained of, and still experiences pain or aching of the loins and limbs; and the urine is very high coloured, turbid, or even bloody in some cases, and generally scanty, and voided frequently. The inflammatory action in all these complications is modified more or less from the sthenic condition characterising the primary inflammations occurring in persons whose vital influence and circulating fluids are not contaminated by an animal poison or infectious agent. The poisonous emanation which has infected the frame, and is multiplying itself to an indefinite extent, so as to propagate the malady to all who are predisposed to it, reinforced by obstruction of the several emunctories, so changes the states of vital power, of vascular action, and of the circulating fluids, from the healthy sthenic conditions, as very materially to modify the local complications, as respects both the state of vascular action and the morbid products or consequences of that action; so that these complications, although inflammatory in their nature, or as regards the disordered vascular action of the part affected, are imbued by a certain vice or diathesis appertaining to, and imparted by, the specific poison contaminating the frame, and are further affected by the interrupted functions of the kidneys and skin, so as to modify them remarkably from primary, sthenic, or pure inflammations; and the modification is great in proportion to the depressing and contaminating action of the poison, and to the accumulation of excrementitious matters in the blood, — to the adynamic, putro-adynamic or septic character of the fever, — the same relations subsisting between the constitutional and local morbid conditions in this disease as were shown to subsist in other fevers. (See art. FEVER, §§ 109, 110.) Although this type or form of the disease is often complicated, and irregular as respects the eruption, yet it frequently assumes the regular form described above (§ 4.), the febrile action being generally more intense.

20. *C. SCARLATINA MALIGNA*; *Pestilens faucium affectus* of SGAMBATI; *Angina puerorum epidemica* of BARTHOLIN; the *Garotillo* of ZACCUTUS LUSITANUS, — the *Pædanchone loimodes* of SEVERINUS; — the *Angina maligna* of DE HEREDIA; the *Malignant ulcerous sore throat* of HUXHAM; the *Purpura epidemica maligna* of SCHULTZ; the *Malignant sore throat* of JOHNSTONE; the *Cynanche maligna* of CULLEN; the *Putrid sore throat* of various authors. — The type of the disease which has been last described passes into this by insensible gradations, not only as respects different cases occurring during the same season, in the same locality, but even in the same family. Sometimes even the attack may present an inflammatory character at its outset, and soon afterwards assume an adynamic, typhoid, or malignant form. But it usually commences in an adynamic or asthenic form, especially in autumn and winter, and in

delicate, relaxed, or exhausted subjects, in those debilitated by other diseases, and in weak female children, or those living in low, damp, and close situations. The patient is first affected with languor, lassitude, weakness, and vague pains through the body. These are succeeded by giddiness, chilliness, or shivering, followed by great heat. These latter alternate for several hours, until at last the heat becomes more constant and intense. The patient then complains of faintness, great pain in the head, and of violent sickness with vomiting, or purging, or both, especially in children, more rarely in adults. Heat and soreness are felt in the throat, and stiffness and tenderness in the neck. The face soon appears red or flushed, swollen or bloated, occasionally pale and sunk; the eyes are red, watery, heavy, or suffused. There are great fretfulness, restlessness, anxiety, leipothymia or faintness, and remarkable dejection of spirits.

21. The pulse from the first is quick, small, and fluttering; in some soft and full, but weak and irregular, but always without that firmness and strength observed in inflammatory diseases. Dr. JOHNSTONE remarks, that if blood be taken from a vein soon after the attack, instead of forming a firm crassamentum, "it continues in the state of a gelatinous texture." The urine at first appears crude like whey; as the disease advances it becomes yellower, as if bile were diluted with it; or turbid, scanty, high-coloured, and sometimes it contains dissolved or decomposed blood-globules. At the same time as, or soon after the attack, the fauces, uvula, tonsils, and pharynx become red and swollen; and soon afterwards covered in parts by ash-coloured or dark exudations, which appear as sloughs. The tongue is now deep red or brown, dry and glazed, and sometimes so tender and chapped as to readily bleed. The throat soon acquires a dusky-red, brown or livid hue, and the exudations on the fauces and tonsils are darker, and often cover gangrenous ulcers. The febrile or constitutional disturbance presents an extremely typhoid or asthenic character, or putro-adynamia. The skin is hot; but there is little thirst, although the mouth is dry; and the teeth and lips are covered by sordes, or by an acrid fluid from the excoriated or ulcerated throat. The breath is remarkably foetid and contaminating.

22. The efflorescence often appears on the second or third day of the disease, and the hands seem as if they were stained by the juice of raspberries. It frequently soon recedes and recurs; and is generally irregular. When it is abundant, it is often dark, dusky, or even livid; and it is often accompanied with petechiæ, more rarely with œdema. The breaking out of the eruption sometimes relieves the vomiting and purging often ushering in the disease. The parotid and submaxillary glands swell and become painful. The neck and throat are cedematous, the swelling sometimes extending to the breast. In this case suffocation is threatened, the breathing being rattling as if the patient were being strangled. A viscid secretion, scanty and adhesive, is produced by the salivary glands; and an acrid thin discharge exudes from the nostrils and from the angles of the mouth, the lips and cheeks exhibiting an aphthous appearance. The affection of the throat often extends along the tubes to the ear; and not only does gangrenous ulceration affect portions of the velum or fauces, but the tympanum and bones

of the ears are destroyed, and an offensive acrid discharge flows from these parts. When the patient swallows the excoriating fluid exuded by the affected throat, diarrhoea, with excoriations of and about the anus, is of frequent occurrence. In these cases the pharynx occasionally is remarkably affected, and is covered by deep sloughing ulcers, extending in some instances to the cellular, muscular and ligamentous structures anterior to the cervical vertebræ and intervertebral substance. The larynx and trachea, the former especially, are not infrequently implicated, occasioning sudden suffocation and death. The lesion of the throat often extends further than the pharynx, and even implicates the upper part of the œsophagus, deglutition being difficult or painful, or the fluids being rejected forcibly through the nostrils.

23. The febrile action is often in young children attended by coma, and generally in older subjects by delirium, which often lapses into coma. The delirium is commonly low or muttering; but it is sometimes violent or frenzied. If it ceases in the morning, it generally recurs in the evening, or is even constant. In the more violent cases, the efflorescence either suddenly disappears or becomes livid; the fauces are black, and the breath most offensive; the eyes lose their lustre, and the swelling of the neck increases. The stools and urine are evacuated involuntarily, the former being frequent, watery, and most offensive, sometimes bloody; the latter, turbid, brownish, or suppressed. The surface becomes cool; the countenance bloated, cadaverous or œdematous; the parts pressed upon excoriated or sphacelated; the tongue brown, hard, or dry; the breathing laboured or interrupted by singultus; and death follows, with insensibility, congestion of the lungs, and great alteration of the state of the blood, and of all the circulating and secreted fluids. This result may appear very early—on the second, third, or fourth day. I have seen it occur on the second day, owing, in some instances, to the extension of the affection of the throat to the larynx, the patient dying asphyxied; in others, to a sudden coma, caused probably by serous effusion and alteration of the blood; and, in some, to congestion of the lungs, the depression of organic nervous influence produced by the poison, and the morbid state of the blood, occasioning or increasing these local changes, and consecutively abolishing the vital functions, especially those of the brain, lungs and heart.

24. *D. SCARLATINA SINE EXANTHEMATE.*—*S. eruptione*, R. WILLIAMS.—Scarlet fever may occur without any eruption, cases of this kind appearing chiefly during severe or fatal prevalences of the malady, and often in the same family in which it pursues a regular course. In this variety the nature of the disease is indicated by the morbid affection of the mouth, fauces, and throat, and by the febrile action, which is generally of an asthenic or low character. Dr. JOHNSTONE remarks respecting the malignant angina, prevalent shortly before the time at which he wrote, that “in some cases people have been seized with a severe angina of this kind without any eruption at all; yet even in these cases a great itching and desquamation of the skin have come on. This, however, has always happened among adults, not at all in children.” (p. 33.)—This variety is not always so limited, for I have observed it on several occasions in

children, but in them the absence of the eruption appeared to be owing to the internal complication so frequently attending it in them. Dr. WILLAN observes, that “it is evidently a species of scarlatina, because it affects some individuals of large families, while the rest are labouring under some form of scarlatina, and because it is capable of communicating by infection all the varieties of that disease.” Dr. SIMS, RANOE, EICHEL, HAGSTROEM, and STRUVE, on the Continent, noticed this variety; and FILTER, SPEUN, and others, remarked that desquamation of the cuticle frequently occurred during convalescence nevertheless. Dr. HEBERDEN says, that he has seen the eruption so partial as to be limited to the back of the left wrist. J. FRANK, that both he and others have seen many cases of scarlatina without any eruption at all. Mr. MURRAY mentions the occurrence of twenty cases without any eruption when the disease prevailed at Aford, in Aberdeenshire. Mr. WOOD adduces sixteen cases which he observed during the occurrence of the disease in 1832 and 1833 at Edinburgh, in which no eruption was observed, and he considers these cases to have been those of scarlet fever, because none of these patients became afterwards affected with the fever and eruption, though very freely exposed to contagion in the sick rooms and convalescent wards. Dr. R. WILLIAMS remarks, that “there is seldom a year in which scarlatina has been in any degree epidemic, that cases have not occurred in which patients, not having previously had the scarlet fever, are seized with severe fever and sore throat, unaccompanied by any eruption; and on subsequent exposure to the contagion of scarlatina, they have been found insusceptible of the action of that poison; and hence it is fairly inferred that the disease they have passed through must have been a variety of scarlet fever.” During the many opportunities I have had of observing scarlatina, cases of this variety have come before me; but on no occasion have they been so numerous as in 1848. But it should not be overlooked, that cases of most severe fever and sore throat, with all the indications of malignity, or putro-adyndamia, may occur, as I have observed in several cases, in persons who have already had scarlet fever; and they may thus appear in several members of the same family, probably owing to the existence of endemic contaminating causes, to which I have had occasion to impute them. It may appear singular, as indeed Dr. WILLAN has observed, that the slightest and the most violent cases of eruptive fevers—cases which vary as much in fatality as a flea-bite and the plague—should be associated together and spring from the same origin. Experience has, however, proved that scarlatina simplex, the anginosa, the maligna, and the scarlet sore throat, without the efflorescence on the skin, are merely varieties of the same disease; and that all of them proceed from, and communicate the same infection.

25. There are certain points respecting this variety of the disease which have not been sufficiently investigated; namely,—1st. Is the non-appearance of the eruption owing to the idiosyncrasy?—2d. Is this occurrence owing to the existence or severity of some internal complication?—3d. Is it more frequently followed by affections of the kidneys or other sequelæ than the forms of scarlatina already considered.—(a.) It is difficult

to determine the degree of influence exerted by *idiosyncrasy* in this or in other maladies, as the reference of an anomaly to this cause is merely an attempt to escape from a difficulty, and even when the most confidently asserted, it is often no more than an unsubstantiated opinion. — (b.) As to the *second* point, my experience induces me to conclude, that this variety of the disease is frequently complicated, or followed by dangerous sequelæ; but I am unable to state the exact frequency or the numerical amount of these morbid associations, more particularly in comparison with the other varieties of the malady. I may add, that the fever characterising this variety is most frequently of an asthenic or adynamic kind, even although the affection of the throat may not be very severe or malignant, which, however, it often is, especially in some epidemics; and that complications are frequently found at an early period, upon close examination, but that they are often more or less latent, or masked, until they have reached a formidable height, or they often escape observation, until they are seriously advanced, or are displayed by a *post mortem* inspection. — (c.) As to the *third* question, I believe that affections of the kidneys are not merely occasional sequelæ, but are either concomitants or early complications of some cases of this form of scarlatina; for I have observed that the urine has been more or less albuminous in most cases, and even during, as well as after the disease, although dropsy has not supervened. It may be further remarked that obstruction of the functions of the kidneys in the course of the malady, and the consequent accumulation of morbid matters in the blood—the deficient depuration of the blood,—are the causes not only of the consecutive dropsy, but also of the more immediate complications, or inflammatory congestions and sequelæ observed in the course of this and other forms of scarlet fever.

26. *E. SCARLATINA LATENS.*—*Latent scarlatina.*—*Suppressed scarlatina.*—*Masked scarlet fever.*—*Scarlatina without eruption and without sore-throat.* Both in public and private practice, chiefly the former, rare instances of dropsy, especially anasarca, have for many years back come before me, commonly in children, and in families or localities where scarlatina prevailed; and I have been told by the parents that neither eruption nor sore-throat had been complained of previously to the appearance of the dropsy. I generally disbelieved the report, knowing that the mildest forms of scarlatina are most frequently followed by anasarca; and inferred that either sore-throat or efflorescence had existed, but in so slight and evanescent a form as to escape detection. It was not until early in this year (1848) that I became fully convinced of the actual existence of this variety—of a latent scarlatina; and that the constitutional affection may be produced by this specific poison without developing its two principal or characteristic features—the eruption and the sore-throat; the infection causing, nevertheless, lesion of the kidneys, with other concomitant sequelæ of a most dangerous kind. To one of these very serious and complicated cases of latent scarlatina, I was called in this year by my friend, Mr. JOSEPH HOULTON, who had also recognised the scarlatinous nature of the disease, the case having occurred in a house where this malady existed. During 1848, other cases of the same

kind came under my notice; all of those, which I then saw having been of a complicated nature; and I have heard of several similar instances from other practitioners. Judging from the cases which I have seen, the dropsy consequent upon this latent form of scarlatina is more severe, complicated and fatal, than when it follows the more regular or usual forms of the disease. Is this owing to an early or premature affection of the kidneys resulting from the scarlatinal poison having prevented the manifestation of the disease in the skin and throat—the predominant lesions in this variety occurring in the urinary organs and serous membranes, and not in the usual situations? And is a certain amount of vascular action, with affection of either the throat or skin, or both, requisite to prevent the consecutive obstruction or lesion of the kidneys, productive not merely of dropsy but also of other concomitant or consecutive lesions? If it be admitted that the morbid effects of the scarlatinal infection or poison are exerted primarily and chiefly on the kidneys and serous membranes or other internal parts in these cases, it may be reasonably inferred that the usual manifestation of the infection on the skin and throat will be thereby prevented and suppressed; and that the danger of the disease will be greater, when these important organs and parts are attacked, than when the skin and throat are moderately and not malignantly affected. Upon referring to authors respecting this variety of the disease, I can find no notice of it excepting in the clinical lectures of Dr. GRAVES, where he states, that some years ago scarlatina attacked all the children in the family of a medical practitioner, with the exception of one young lady, who, when the children were convalescent, was attacked by anasarca. Her father was much struck with the occurrence, and felt convinced that it was the result of latent scarlatina. One topic as to this variety is worth consideration, viz. the relation subsisting between the infection, the fever caused by it, and the renal and other consecutive affections,—as to whether the disease of the kidneys and the often associated affections of serous surfaces, and of other parts, are the immediate effects of the poison in these cases, no eruptive fever, either with or without its usual concomitants of sore throat and efflorescence having existed; or whether this fever and these concomitants actually preceded the renal and other affections, but in such a slight and evanescent a manner as entirely to have escaped observation. From what I have myself observed, especially during 1848, I conclude that scarlatina may be prevented from being developed on external parts, owing either to the state of the constitution of the person affected, or to the primary operation of the scarlatinal poison on the urinary organs and serous or other structures. That the state of the recipient has something to do with this irregularity, or latent form of the disease, is indicated by the circumstance that most of the patients in whom I have seen it were cachectic or anæmied, their vital energies appearing insufficient for the development of the characteristic local and external manifestations of this malady. It is not unlikely, however, that the primary fever, consequent upon the infection, may have been so slight in all its phenomena as to have escaped detection; and yet, as in the slight but more obvious cases of eruption, to be followed by severe consecutive disease, these

latter cases being admitted to be the most liable to such consequences.

27. iii. COMPLICATIONS OF SCARLATINA.—The complications, or predominant affections of vital organs or parts, constitute the most important topics in the history and pathology of scarlet fever. It may be remarked generally as regards them, that their nature and tendency depend chiefly on the character of the constitutional disturbance—on the states of vital or nervous power, and of vascular action, in connection with the condition of the blood; and that they may be inflammatory, or actively or passively congestive, or either of these associated with so remarkable a loss of vital power and cohesion, as to be rapidly followed by disorganization. In all complications occurring in the course of scarlatina, or of other specific infectious maladies, the local affections should be viewed as prominent lesions only, the whole frame being more or less infected or poisoned by the animal miasm, rather than as independent morbid conditions requiring a special treatment. However inflammatory, or however congestive the complication or prominent disorder may seem in these maladies, it should never be viewed, either pathologically or therapeutically, in the same light as inflammation or congestion occurring primarily or independently of a specific infection. The former has a peculiar character imparted to it by the specific poison, lowering and modifying organic nervous power and contaminating the fluids, whilst the latter is devoid of these poisonous influences and changes, and of their progressive consequences. Accordingly we find that the same means as are successfully employed to remove inflammation, or congestion or effusion, taking place primarily or independently of a specific infection, would be either quite inefficient or even injurious, if employed against these, when supervening as complications or prominent disorders in the course of scarlet fever or other infectious maladies. These latter are imbued with the constitutional characters of these diseases—and partake of the type and diathesis which they manifest.—The most important of the *complications* or *prominent affections* observed in the course of this malady, are—1st, Congestion or other lesions of the urinary organs;—2d, diffusive or asthenic inflammation extending from the throat to parts in the more immediate vicinity;—3d, diffusive, or asthenic inflammation of the gastro-intestinal villous surface;—4th, affection of the membranes or substance of the brain;—5th, asthenic pleuritis or pericarditis, or both;—6th, asthenic pneumonia, or congestions of the lungs;—7th, affection of the synovial membranes with effusion into the joints. Other organs or parts may be seriously affected, or even disorganised in the course of, or during convalescence from, scarlatina; but certain of these will be comprised under the head of sequelæ; and two or more of the affections now enumerated may even exist in the same case either coëtaneously, or in rapid succession.

28. A. The *kidneys* may become affected in a very prominent manner early in the course of the disease: indeed I believe them to be always more or less affected at an early period, although this affection has been overlooked at this period, and recognised only during the processes of desquamation and recovery. It is chiefly at certain seasons

and during certain prevalences of the distemper that this early obstruction of these organs is most remarkable. I have met with it on many occasions; very few authors have mentioned the occurrence even of its usual consequences at this period. JOHNSTONE, however, observes that “in some the face is much bloated and very sallow, the whole neck much swelled, and has a cadaverous look, and the whole body cedematous to such a degree that an impression made with the finger will remain fixed. The breath, towards the fourth or fifth day, becomes more and more foetid, and the patient spits up a large quantity of stinking purulent mucus, sometimes tinged with blood and of a livid colour.” (p. 38.) In the cases attended by more or less cedema, or anasarca, during the period of the eruption, or associated with a deep or dark coloured eruption, the patient, if not delirious or comatose, generally complains of much aching in the loins and pains in the limbs; and the urine either is very scanty, very high-coloured, of a muddy brown, or dark-red colour from the mixture of blood globules, sometimes albuminous; or it is more or less or altogether suppressed. The importance of ascertaining the existence of this complication during the early stages of the disease is extremely great, inasmuch as the issue will depend much upon the treatment adopted for it. I cannot hesitate to state my conviction that, in many cases which terminate fatally at an early period of the disease, whether the eruption be abundant or scanty, or altogether suppressed, this issue is in great measure owing to the early implication of the kidneys having been overlooked; for I have remarked, in many instances, as respects both the symptoms during life, and the appearances of the kidneys after death, sufficient evidence to convince me that *these organs are remarkably congested, and their secreting and tubular surfaces are the seats of a similar vascular injection or efflorescence to that existing in the vascular rete of the skin; and that this efflorescence on the surfaces of the uriniferous tubes, &c., and the associated swelling and congestion of these organs, during the early stages of the malady, either impede, or interrupt, or altogether suppress the function of urinary excretion, and thereby occasion an accumulation of excrementitious and contaminating materials in the blood, and consecutively an increase of the poisonous action of the infected blood upon the nervous system and on vital organs and parts, thereby producing further complications, more especially those about to be described.*

29. In this early period of the disease, the interrupted functions of the kidneys, produced in the manner now stated, has the effect not merely of preventing the discharge by these emunctories of the usual excremental matters in the blood, but also of arresting the evacuation of those morbid materials evolved in the blood from the action of the infectious miasm upon the nervous and vascular systems. The obstruction of the kidneys, arising as just explained during the early stage of the disease, produces a more immediate and a more intense or acute effect, than the obstruction so frequently caused subsequently, and during or after the process of desquamation, by the accumulation and infarction of the epithelium scales thrown off from the uriniferous tubes. The obstruction in the uriniferous tubes, caused by the accumulation of epithelium scales in them during

this latter period, is entirely the result of a species of desquamation, as respects these tubes, consequent upon the vascular action, congestion, and tumefaction of which they, with other parts of the kidneys, are the seat in the eruptive or early stage, and which, in this stage, frequently becomes, as just stated, the source of the most acute and fatal complications. The obstruction of the kidneys in the early stage, arising, as now shown, is often more complete and rapid in its accession, than that which follows in the last stage as a process of desquamation, and hence the consequences are generally not so severe nor so fatal in this last stage, especially when due precautions are used during the period of desquamation.

30. *B. Inflammation of a more or less asthenic or diffusive kind* may extend in more than one direction from the throat, especially in the more malignant states of scarlet fever; and this complication may be more frequent in certain seasons and epidemics than in others. — (*a.*) The most dangerous and rapidly fatal of these extensions of the local affection are *laryngitis* and *tracheitis*. When the angina attending scarlatina is not of a malignant kind, and when the pulse and affection of the throat do not indicate much vital depression or malignancy, the epiglottis and larynx very rarely betray any disorder. But in malignant cases, and in adults, especially those who have been addicted to the use of spirituous liquors, or whose constitutions are broken down, this extension of inflammation to the larynx and trachea, and consequent asphyxia, are not rare. In most of these cases the larynx is only or mainly affected; but in others, especially in children, the trachea is also implicated. In the more malignant cases, death may occur in little more than twenty-four hours from the commencement of the attack, owing to this complication. Of this I have met with two or three instances, in adults, one in a man aged between 50 and 60. In the cases of this kind which I have had an opportunity of examining after death, there was much firm lymph exuded over the tonsils and pharynx extending into the larynx, the tissues underneath being swollen, injected, and cedematous.

31. (*b.*) *Pharyngitis* is generally present in a greater or less degree in most of the severe cases of the anginous form of scarlet fever, and more especially, and in a most asthenic form, in the malignant variety. In many of these, especially in certain epidemics or seasons, the morbid action extends to the posterior nares, the nostrils and fauces, on the one hand, and to the upper portion of the œsophagus on the other, and is accompanied with the exudation of greyish lymph which coagulates on portions of the affected surface, and imparts the appearance of sloughs. In some cases, instead of this exudation, an acrid or sanious discharge of an excoriating nature is observed with sloughing ulcers, but these latter are more frequently found in some epidemics of this malignant malady than in others. In most of these cases attempts at deglutition are either very painful and difficult, or altogether abortive, matters being thrown out through the nostrils on attempting to swallow them. Sloughing ulceration is most frequently observed in the tonsils, and is more rare in the fauces, pharynx, or its vicinity; but this and other changes in the throat vary much in different epidemics. They are observed chiefly in

the most malignant cases; and even in more rare instances of this kind which recover, the morbid action has extended posteriorly to the tissues and parts between the pharynx and bodies of the cervical vertebræ, until these latter, and the intervertebral substances and ligaments, have become implicated, and dangerous, if not fatal, sequelæ have followed the pharyngeal complication. Of this I have met with several instances in the course of practice (§ 47.).

32. (*c.*) The extension of the anginous affection along the *Eustachian tubes to one or both ears*, is a frequent and most distressing complication of the more severe states of this fever, and is not infrequently attended by destruction of portions of the soft palate, and of the small bones and membrana tympani of the ears. In some instances, caries of a portion of the temporal bones, and the extension of irritation and inflammation to the membranes, and even to the substance, of the brain, have followed, either immediately or remotely, upon the occurrence of an *asthenic otitis* in the course of malignant or severe scarlatina. In these cases, a discharge more or less copious, and always offensive, takes place from the ears, and in rare instances even *hæmorrhage* from the ears occurs. I have not observed any instance where the hæmorrhage from the ear has been excessive; but Dr. GRAVES has adduced a case in which it was so great as to prove fatal; and it has also been noticed by FOTHERGILL.

33. (*d.*) *Epistaxis* may occur in the course of scarlatina from very different pathological states. It may attend, or appear early in, the stage of eruption, especially in plethoric children, in those accustomed to epistaxis, or in those of a sanguine temperament and hæmorrhagic diathesis. If it be moderate, or even considerable, it may alleviate the cerebral symptoms, and be even critical or beneficial. This, however, occurs chiefly in the more inflammatory states of the disease. But when it is excessive, or when it accompanies the malignant form, it may be only one of the modes in which a fatal issue takes place. Even in the more inflammatory or sthenic forms of scarlatinal angina, an intercurrent epistaxis may be so excessive as to lower the power of vital resistance, and the patient may sink either from exhaustion, and from the want of correspondence between the capacity of the vascular system and the amount of blood contained in this system; or he may suffer another complication, favoured if not more directly caused by the hæmorrhage, namely, the extension of inflammation, in an asthenic or diffusive form, to the cellular tissue and glands of the neck. When epistaxis occurs in the course of malignant scarlatina, and is preceded by an offensive discharge from the mouth, nostrils, or ears, it may be viewed as a consequence of gangrenous or sloughing ulceration of the fauces, pharynx or posterior nares, and generally it then hastens or causes dissolution. Epistaxis and bleeding from the throat, in these circumstances, are not rare, and have been noticed as more frequent occurrences in some epidemics than in others. These complications have been mentioned by HUXHAM, FOTHERGILL, GRAVES, and others. FOTHERGILL remarks that "the sick sometimes bleed at the nose towards the beginning of the disease; and the menses very often appear in those of the female sex who are of an age to have them."

(Works, vol. i. p. 375.). And at another place he states that, "it has happened in this distemper that hæmorrhages from the nose and mouth have suddenly carried off the patient. I have heard of the like accident from bleeding at the ear. But these fatal discharges most commonly happen after the patient has been ill several days; and it seems more probable that they proceed from the separation of a slough, rather than from a fulness of the vessels, or an effort of nature to relieve herself by a salutary crisis." (p. 376.)

34. (e.) *Diffusive or asthenic inflammation of the cellular tissue* of the neck is one of the most dangerous complications of scarlatina, and is apt to occur when the throat is most malignantly affected. Dr. JOHNSTONE has remarked upon the frequency of this complication in the epidemic scarlatina of 1778. "The parotids also swell," he states, "grow hard and painful to the touch, and, when the disease is violent, a large œdematous tumour surrounds the neck, extends to the breast, and greatly increases the danger. The breathing then becomes more difficult, with a kind of rattling noise as if the patient was suffocating." This extension of the disease to the glands and cellular tissue of the neck is frequent during the prevalence of malignant scarlatina. I have often observed it, and it has been duly remarked upon by Dr. KENNEDY, GRAVES, OSBREY, CHARLTON, and others. This diffusive state of inflammation may be greatest on one side, or it may surround the whole neck and throat and descend to the pectoral muscles. It may accelerate or cause death before passing into gangrene or suppuration, into either of which it may rapidly lapse; and it may exist with the eruption or without it, or the parts affected only may present a dark or dusky erysipelatous hue. It is evidently the result of local contamination, spreading from the ulcerated and infected throat; and it may supervene either as a complication or sequela of the distemper; but however it may appear it requires the intentions and means of cure described in the article on diffusive inflammation of the CELLULAR TISSUE.

35. C. *Asthenic or diffusive gastro-enteric disorder* is a very frequent complication or prominent affection in the more malignant cases of this malady. It may occur either with, or without vomiting, or it may only commence with this symptom; and it may be attended by an eruption of a more or less deep tint; or it may cause the sudden suppression, or the non-appearance, of the eruption. It may be caused by the passage of the excoriating discharge from the throat into the stomach, especially in children who seldom spit out the discharge, the gastro-enteric surface being irritated or excoriated by this morbid matter; or it may arise primarily as a prominent phenomenon of this fever, and by its increase, or general diffusion over the digestive mucous surface, prevent the evolution of the efflorescence on the cutaneous surface. Dr. JOHNSTONE remarks, that the acrid matter passing from the throat into the stomachs of children is "one reason why they are attacked with these violent gripings, dysentery, and excoriations of the anus and buttocks which sometimes attend the distemper, and show that the sanies retains its virulence throughout the alimentary canal." (p. 39.)—The same statement had, however, been made by Dr. FOTHERGILL thirty years

previously, and nearly in the same words (see his Works, vol. i. p. 374.). HUXHAM also remarks that a sudden stoppage of the discharge from "the mouth and nostrils actually choked several children; and some swallowed such quantities of it as occasioned excoriations of the intestines, violent gripings, dysentery, &c., nay, even excoriations of the anus and buttocks." (On Fevers, p. 280.) Dr. GRAVES adduces a case in which these excoriations were observed around the anus, but in it the cutaneous eruption was intense. In most of the cases in which I have observed irritability of stomach and diarrhœa, with or without excoriations of the anus, in the course of scarlatina, the eruption was either suppressed, or partial and scanty, or prevented from appearing, the throat, however, being more or less affected. In the first two cases of this complication which came under my care, and which I attended with Dr. CLUTTERBUCK in 1821, the eruption disappeared, diarrhœa occurred, and profound coma, with unconscious evacuations, supervened and further complicated the disease. Nevertheless both cases recovered. When diarrhœa complicates this distemper, especially in children, coma, or convulsions, or insensibility from vital exhaustion, not infrequently supervenes. When the diarrhœa is moderate and not attended by vomiting, and when the evacuations are bilious or feculent, then it may be salutary, or at least not injurious; but when it is consequent upon severe affection of the throat, or is attended by œdematous swelling of the neck, or is severe, the stools being watery or slimy, muddy, and very offensive, it is liable to be followed by coma or fatal exhaustion.

36. D. *Convulsions, coma, and tremors*, are frequently observed in the course of the more severe cases of scarlatina, and in the more nervous form of the disease; or in children of a nervous and susceptible temperament, convulsions, delirium, coma and tremors may occur in succession. These complications, like many others, may appear either when the eruption is very full and general, or when it suddenly or prematurely fades, or when it becomes partial or recurrent; but generally the skin continues hot and dry.—(a.) In very young children, *convulsions* may take place at or during the commencement of the distemper; and in this case they generally usher in a malignant or severe attack; and they may not appear afterwards. But they may occur at any period, or not until near the fatal termination of the disease. They are seldom attended by squinting, and the pupils of the eyes are rarely dilated—generally they are contracted.—(b.) Coma may supervene very early; but in children above five or six years of age it is generally preceded by delirium, and, in children under this age especially, it is often attended by partial convulsions. When coma takes place early in the disease, it cannot be imputed to serous effusion between the membranes or in the ventricles of the brain; but rather to congestion or to a loss of cerebral power; and, even when it supervenes at a more advanced period, it is to be attributed rather to these states than to effusion, although vital exhaustion and the morbid state of the blood may also be concerned in causing it. In most instances, and in whatever stage of the disease in which it occurs, the pupils are generally contracted. Although a dangerous, it is not a fatal complication, for I have seen several patients re-

cover from it.* When, however, it is attended by disappearance of the eruption, by a glassy state of the eyes, pallor and sinking of the features, tremors or startings of the tendons, and other signs of sinking of the powers of life, a fatal issue soon follows. Coma, convulsions, and other nervous symptoms, may occur also as *sequelæ* of scarlet fever, but generally in connection with renal obstruction and anasarca (§§ 41 *et seq.*).

37. *E. Congestion of the lungs, bronchitis, congestion, or asthenic pneumonia*, and even combinations of these, with or without *pleuritis*, are frequently prominent affections in the course of the more severe forms of scarlet fever. In most instances both lungs are affected, and bronchitis and lobular pneumonia are not infrequently associated, or are rapidly consecutive of each other. In the most severe cases, the general diffusion of disease through both lungs, added to other existing morbid conditions, has terminated life in from thirty to forty hours, or even in a shorter time, after the first appearance of the pulmonary complication. In these cases the substance of the lungs soon become solidified, especially in parts, and infiltrated with a bloody serum; the state of congestion insensibly passing into asthenic solidification, or splenization, especially in the posterior or depending parts. The complications now mentioned may also occur in the milder or less malignant states of the disease; but generally either in an advanced stage or as *sequelæ*; and in these circumstances they approach nearer to the usual character which these affections present, although more or less modified, and requiring, owing to the state and nature of the constitutional disturbance and contamination, a peculiar mode of treatment.

38. *F. Pleuritis and pericarditis* may take place either separately or in combination, or in connection also with affection of the lungs. The occurrence or association of these varies much in different epidemics and seasons, whether appearing as complications or as *sequelæ* of scarlatina. As *complications* they are met with chiefly in severe or irregular cases, in which the eruption either is suppressed or does not appear; and, as *sequelæ*, they most frequently follow mild cases, and in connection with anasarca and disorder of the urinary excretion; and, in these circumstances, they are soon followed by effusion, especially into the pleural cavities. These prominent lesions may exist and escape detection, either until they are far advanced, or until disclosed by a post mortem examination. This is particularly the case with respect to pericarditis, and even as regards pleuritis. A very careful and frequent examination is required to determine its presence in young children during the severer states of the malady.

39. *G. Peritonitis* may appear as a complication of scarlatina, either consecutively of diarrhoea and vomiting, or independently of these. I have, however, rarely met with it during the stages of

eruption; but more frequently as a sequela of the malady, and in connection with obstruction of the kidneys and anasarca. It may generally be recognised, at whatever period it occurs, by the tenderness, fulness, and tension of the abdomen; by vomiting, and the heat and dryness of the surface of the trunk; and most frequently by the disappearance of the eruption. It usually soon terminates in effusion and in death, if not early detected and treated by means which will arrest the morbid action without depressing the vital energies, an intention which on a few occasions may be accomplished.

40. *H. Affections of the joints, erysipelas, gangrene, &c.* may occur during an advanced stage of the more malignant states of the distemper, or even as *sequelæ*, during the period of desquamation, and, with the rest of the complications already noticed, are to be attributed chiefly to the following pre-existing changes:—1st. To the change produced by the infectious miasm upon the organic nervous influence and vascular system.—2d. To the alteration of the blood arising from this primary change, and from the action of the miasm on the constitution of the blood itself.—3d. To the active congestion, obstruction, and consecutive changes taking place in the kidneys at an early stage as well as during the periods of desquamation and convalescence, whereby the blood is further changed by the accumulation of excrementitious elements or materials in it, owing not only to the obstruction of the kidneys, but also to suppression of the functions of the skin,—two of the chief emunctories, by means of which effete and hurtful materials are carried out of the circulation,—these two chief organs of depuration being more or less interrupted or obstructed in their functions, during this disease. Owing to these consecutive series of changes, serous effusions take place not only in the larger shut cavities, with more or less irritation or asthenic inflammation of serous membranes, but also into the cavities of the joints, irritating the synovial membranes, and eroding the cartilages. Owing to these changes also, the internal surface of the blood-vessels, in predisposed parts, become inflamed or obstructed, and eliminating surfaces irritated or diffusively inflamed; the affected parts, owing to the depressed state of organic nervous power, and to the morbid condition of the blood circulating in it, soon losing their vital cohesion, and passing into sphacelation,—changes readily accelerated and increased by pressure and the contact of morbid secretions or excretions.

41. III. THE SEQUELÆ OF SCARLATINA.—Having given the *complications* or prominent local affections of scarlet fever that amount of consideration which their importance demands, and which has not been accorded to them by previous writers, and having pointed out the sources or causes of their origin, of their severity, and of their fatality; and having stated that an attentive examination of the early as well as of advanced phenomena of scarlatina, and the lesions observed after death, show these sources or causes to be chiefly, or in great measure, the changes which take place in the kidneys at a much more early period of the distemper than has hitherto been believed, I now proceed to consider the more important *sequelæ* of the malady, and with due reference to their sources. If the inferences at which I have arrived from an

* HILDENBRAND observes:—"Insignem vero, et quasi innatam, febris scarlatinæ miasma ad membranas serosas, et in primis ad membranam arachnoideam encephali habet proclivitatem, ita quidem, ut non solum exanthemate derepente represso vicariæ in cerebro libentissime subnascentur reactiones, verum etiam lætissime florente manifesta evolvantur congestionis cephalicæ, aut verè encephalitis, indicia. Quod autem arachnoidea, et non alia patiatür meninx, effusiones serosæ in peremptorum cadaveribus conspicuæ evincunt."—(*Institut. Pract. Med.* t. iv. p. 383.)

attentive observation of the phenomena of scarlet fever be received, the sequelæ as well as the complications of the disease may be assigned to nearly the same sources. The *primary* obstruction of the kidneys is chiefly concerned, as shown above (§§ 28, 29.), in rapidly developing or increasing the *complications*, aided, however, by obstruction of the functions of the skin; and the *secondary* or consecutive obstruction of the same organs is equally concerned in producing the *sequelæ*, as already stated (§ 29.), and with the same aid. The very same organs, surfaces, or parts which are the seats of the complications or prominent affections, may also be seats of those lesions which constitute the sequelæ. Indeed the local changes described above as complications may appear so late in the disease as to be considered with propriety as sequelæ, whilst those usually denominated and viewed as sequelæ, may supervene so early as to deserve the former appellation.

42. It has been stated above, that the complications are most apt to occur in the more severe states of the distemper, whether inflammatory or malignant; and that the early affection of the kidneys — as early probably as the occurrence of horripilations, faintness, vomiting, pains in the back and limbs, &c. ushering in the attack, or soon after this period, — by obstructing the functions of these organs, and thereby augmenting the contamination of the blood, increases, in the first place, the intensity and malignancy of the febrile action — of the constitutional disturbance; and, with such increase, next develops local lesions of a severe or fatal character. The state of the skin probably aids also in producing these effects. If this be admitted in respect of the more severe cases, it follows, that the milder cases of the malady are attended by a much more slight affection of the kidneys, and that the urinary secretion does not manifest so much disorder or obstruction in these latter cases as in the former. Now this is exactly what is usually observed. But it has been very generally stated, that these milder cases are most likely to be followed by renal disease and dropsy. This is partly true; and is observed to obtain in some seasons more than in others, and more especially in certain epidemic prevalences of the distemper. It may be inferred, from what I have stated, that the sequelæ should be the most severe after the most malignant cases; but the obstruction of the urine in many of these is such as fatally to increase the malignancy; and those who recover very frequently experience a general and profuse perspiration, or copious discharges from the alimentary canal or other parts, which are somewhat vicarious of the obstruction of the kidneys, or which derive from these organs and diminish the consecutive affection. Besides, the amount of the consecutive obstruction may not be always great in proportion to that of the primary affection; for this may be rapid in its accession, and great in its amount, in respect both of the secreting structure and of the uriniferous tubes, and yet the obstruction caused by the desquamation of the epithelium, or the accumulation or infarction of the desquamated epithelium in the tubes, may not be so great as to cause any serious change either in the blood, or, through it, in other parts. When the functions of the skin are restored, and determinations of blood towards the kidneys, and congestion of these organs, by exposures to cold and

other causes, are prevented, the desquamation of the uriniferous tubes may take place gradually and without obstructing the urinary excretion, whilst such obstruction would very probably occur if the kidneys were the seats of vascular determination or congestion, caused by constriction of the cutaneous surface, and by the arrest of the cutaneous excretion.

43. The frequency of sequelæ arising out of the obstruction of the kidneys, and the severity of these sequelæ, often are greatest after very mild cases, and in the latent states of the disease (§ 26.). So very remarkably is this the case, as respects the latent form, and so dangerous are the associated affections sometimes attending this form, that I have had reasons to doubt whether the obstruction of the kidneys was, in this form, actually consecutive of an antecedent febrile attack, unattended by eruption or sore throat, or whether it was the primary change produced by the infectious miasm, which, instead of developing either a cutaneous eruption, or a sore throat, had affected the kidneys in so severe a manner as to prevent the more external evolution of the disease, and to obstruct the urinary excretion, thereby increasing the contamination of the blood, and the amount of its watery constituents, and occasioning other dangerous consequences, more especially the several forms of dropsy, with or without irritation or inflammation of vital organs or of serous membranes. However the renal obstruction may arise, — whether *secondarily*, as usually admitted, or both *primarily* and *secondarily*, as now first contended for, or sometimes *primarily only*, as just suggested — the consequences of its existence upon the state of the blood must be most serious. The blood necessarily becomes altered, both as respects an increase of its watery constituents and of its saline and solid ingredients, and, as regards the formation of injurious materials from the elements furnished by the processes of ultimate assimilation, of absorption, and of imbibition or endosmose, even independently of, and in addition to, the more special changes produced by the poisonous miasm, or infectious ferment, in the progress of the development of its effects and of the multiplication and dissemination of its kind. The more manifest consequences as regards the blood are an increase of the serous portion, and a diminution of the vital crasis, of the fluid and of the cohesion of the crassamentum. The globules or molecules which concrete into fibrine, either partially or altogether cease to cohere in such a manner as to form this substance, causing an apparent deficiency of fibrine, although these globules or materials which form it are actually not deficient, or are even in excess. The depression of organic nervous or vital influence, and the primary and secondary changes of the blood, diminish or otherwise affect the fibrine by depriving the globules, or the material principle constituting this substance, either partially or completely, of the power of cohering so firmly as to produce it, with its characteristic properties, more especially in the advanced stages of the distemper.

44. The consequences of an excess of the watery portions of the blood, and of the other excrementitious matters, and of the existence of other injurious products, which may be reasonably inferred to be present, although not admitting of demonstration, may be briefly stated as follows:

— 1st, The development of irritative fever, the pulse becoming very rapid, vital power depressed, and the skin burning, &c. ;— 2d, Over-distension, oppression, or congestion, of the vascular system, more particularly of the veins and capillary vessels, in predisposed and weakened organs :— 3d, With the continuance or progress of these states, asthenic irritation or inflammation, with more or less effusion, serous or sanguineous, into serous cavities, or into cellular or parenchymatous structures, according as pre-existing conditions, or previous lesions or predispositions may favour their occurrence. — Thus we observe, not only as *complications* of the several stages of scarlet fever, but also as *sequelæ* during desquamation and convalescence, various modifications and associations of the pathological conditions just stated—modifications and associations caused by states of predisposition, by the dose or amount of the infecting animal poison, and by the grade and kind of alteration produced in the circulating fluids, and consecutively in serous, mucous, and cellular parts.

45. Having shown the origin of the chief *sequelæ* of scarlet fever to be obstruction of the kidneys, frequently aided by constriction of the vessels, and obstruction of the functions of the skin, but as frequently arising without such aid, it is unnecessary to add more than to briefly notice the chief affections which supervene, either from this cause, or from the disease of the throat, during desquamation and convalescence. Certain of these require merely an enumeration at this place, although they are most important as respects the amount of lesion which attends them ; but these lesions, when thus produced, are more fully considered under those heads to which they more legitimately belong—namely, as consecutive alterations or diseases of the structures or organs in which they are seated. Although obstruction of the functions of the kidneys and skin, with more or less of structural change of the former, is productive of a large proportion of the *sequelæ* of this malady, still the lesions, which were situated in the throat and its vicinity during the early stages, either by their continuance, their extension, or their severity, or by their recrudescence, owing to obstruction of the depurating functions, or to exposure to cold or humidity or currents of air, sometimes deserve to be ranked among the most serious *sequelæ* of scarlatina.

46. A. The most important of the *sequelæ* which are produced chiefly by the affection of the throat are, *the extension of disease to the ear*, with the consequences of this extension, especially destruction of the small bones of the organ ; inflammation, ulceration, and perforation of the tympanum ; chronic otitis with offensive discharge ; inflammation, and ulceration of the membrane lining the cochlea and semicircular canals ; caries of the petrous portion, or mastoid process, or other parts of the temporal bone ; and even the extension of inflammation, suppuration, or ulceration to the membranes and substance of the brain, may supervene, and, as respects these latter changes especially, not infrequently at remote periods from the primary affection of the throat and the extension of lesion to the internal ear. When disease of the ear is so far advanced as to implicate the bone in which the organ is lodged, the consequences are serious, not only as respects the organ

itself, but also as regards adjoining vital parts, the affection of which often occasions great and protracted suffering, and ultimately fatal results. (See arts. BRAIN AND ITS MEMBRANES, §§ 58. *et seq.* and EAR, §§ 20. *et seq.*).

47. B. The extension of inflammation, and even of ulceration from the posterior *pharynx* to the *cellular, muscular, and ligamentous tissues* interposed between this part and the base of the cranium and upper cervical vertebræ, has been noticed above in connection with the advanced course of the malady (§ 31.). But this lesion is met with not only as a complication, but also as a *sequela* of scarlet fever. In either form, in the latter more especially, it is often attended by spasm, contraction, or painful distortion of the head or neck ; and in this state, the lesion has often been viewed as merely consisting of irritation, or of simple “crick in the neck,” or of rheumatism from cold, and been overlooked until it has advanced to disease of the intervertebral substance, to destruction of the ligamentous or cartilaginous structure, and even to *caries* of the bones at the base of the skull, or of one or more of the cervical vertebræ, with thickening of the ligaments and of the theca of the canal, and complete or incomplete, partial or general paralysis. Of this *sequela* I have seen several instances, and two of complete recovery, with much shortening and stiffness of the neck from destruction of one or two of the cervical vertebræ, and ossific adhesion of those adjoining.

48. C. The *parotid glands*, the *lymphatic glands*, and the adjoining *cellular tissue*, are not infrequently enlarged, congested, or inflamed after an attack of scarlatina, especially in scrofulous subjects, and in delicate persons residing in low, damp, or unwholesome situations. These are often merely the persistent or exacerbated states of the same affections which commenced at an early period of the fever ; but they sometimes do not appear until much later, and although the connecting cellular tissue may be somewhat swollen, it is much more rarely the seat of diffusive inflammation than in the early stages of the malignant form of the disease. Whether existing merely as the remains of an early complication, or as a more or less remote *sequela*, these affections are often troublesome, especially when they advance to chronic suppuration or abscess, as most frequently is the case in these circumstances ; enlargement of the parotids often accompanying the other *sequelæ* of the disease.

49. D. *Affection of the kidneys, after scarlatina, and its consequences.*— (a.) When the pulse continues very quick or sharp after scarlatina, for a longer time and in a more marked degree than may be attributed to debility merely, or to some degree of anæmia, the continuance of irritation in an internal organ or part, or the existence of obstruction of a depurating or excreting organ may be inferred ; and the same inference may be drawn, although the febrile symptoms had subsided, from the recurrence or supervention of this state of the pulse, during or after desquamation, especially if there be also present languor and peevishness, heat and dryness of the skin, pausea or vomiting ; pain or aching in the loins and limbs, drowsiness or stupor. When these symptoms appear, or if, with these, the tongue is loaded or furred, the bowels costive or irregular, and thirst increased, with or without horripilations,

then should the urine and the region of the kidneys be carefully examined, and the approach of *œdema* or *anasarca* be expected, if indeed either be not already present. In many cases the symptoms which precede the *anasarca* are so slight as to escape observation until *œdema* or fulness of the face, or indications of commencing *anasarca* evince the nature of the affection. In other instances the febrile commotion, with the symptoms now mentioned, are more or less manifest for a short time before, and contemporaneously with, the first appearance of *anasarca*. In every case the urine is at first scanty, often high-coloured, or turbid and albuminous; it is more rarely bloody, or of a pale red colour; sometimes it resembles water in which flesh has been washed; and there is always a frequent desire to pass it. In the less severe cases the urine is more copious, but is still turbid, and sometimes it contains numerous small fibres consisting chiefly of epithelium floating in it. After the face, the feet, ankles, wrists and hands first become *œdematous*; and in some instances the dropsy may not advance much farther; but more frequently the trunk and body generally become *anasarcous*; and in the more severe cases, or when the urine is very scanty, bloody, and albuminous, or altogether suppressed, either contemporaneously with the incipient *anasarca*, or during its progress, symptoms of effusion on the brain, or in the cavities of the chest, or in the abdomen, or even in all, make their appearance and sometimes rapidly terminate life. These rapid and complicated cases of effusion are, in some epidemics, more frequent than in others, and are more especially so in the latent form of the disease (§ 26.), or when there has been no antecedent eruption or sore throat, or when the disease is apparently attacking the kidneys and serous surfaces primarily, the evolution of its more external features being thereby prevented. The vascular excrementitial plethora produced by the obstruction of the kidneys occasions effusion into cellular parts, effusion from serous membranes, and asthenic or diffusive inflammation or *œdema* of parenchymatous organs, which, with the morbid state of the blood produced by the urinary obstruction, become the more immediate causes of death, but chiefly in the severer forms and more complicated states of the disease.

50. (b.) *Anasarca* and its morbid associations may occur at any period after the eruption, as well as more rarely, but occasionally, in some epidemics, even during the eruption; but commonly from the fourteenth to the twenty-eighth day from the commencement of the disease, the 21st, 22d, 23d, and 24th days, being those in which it most frequently appears. The proportion of instances in which these sequelæ or reliquæ of scarlatina are observed differs much in different seasons and prevalences of the distemper. The dryness or humidity and temperature of the air, the weather, the prevailing epidemic constitution, and the treatment, must necessarily cause considerable differences in the ratio of these sequelæ at different times. Dr. WILLIAMS states that at HERIOT'S Hospital, in 1832 and 1833, nine cases of dropsy occurred in forty-five; and that in the London Foundling Hospital only three were affected with dropsy out of 100 cases of scarlatina. Mr. HAMILTON says, that a larger proportion of the numerous cases of scarlet fever which he attended in

Edinburgh in 1832 and 1833, became dropsical. According to my observations, dropsy from obstructed kidneys, in all its forms and associations, have been common consequences of scarlet fever for several years up to 1848, during which year it was most frequent, and most complicated. But it appears to have been more or less frequent in all epidemics of this fever which have been fully described; the two occasions of its rare occurrence just mentioned being the most remarkable with which I am acquainted.

51. (c.) The origin of this dropsy was formerly ascribed to the state of the skin, and especially to obstruction of transpiration from this surface, in connection with loss of tone of the capillaries supplying the parts in which the effusion occurred. More recent researches have shown that, however these states may aid in the production of these sequelæ, the affection of the kidneys should be viewed as the chief source of the effusion, and even also of the asthenic or diffusive inflammation and irritation of one or more vital organs sometimes associated with effusion into the shut cavities, whether occurring as complications during the eruption or as sequelæ (§§ 28. 41.).

52. (d.) In the most favourable cases *œdema*, or slight *anasarca*, may only occur and be ushered in, as already stated (§ 49.), with acceleration of the pulse, scanty urine, and other febrile symptoms. But the *anasarca* may be excessive; or, even without being excessive, effusion of serum may also take place in the brain, in both cavities of the chest, in the pericardium, or in the peritoneal cavity. It more rarely is confined to one cavity than extended to nearly all, although in different degrees. As far as I have observed, when it takes place into the pleural cavities, a slight effusion is not infrequent into the pericardium also; and the lungs and pleura are then sometimes inflamed, but more frequently congested; inflammation rarely advancing further than the state of splenization, but usually evincing the appearances of congestive or diffusive inflammation.

53. (e.) Effusion into the ventricles, or between the membranes of the brain, may take place without effusion into any other cavity, and even without *anasarca*; but it may also be associated with one or more of such affections. When it occurs as a sequela of scarlatina it is generally not so rapid or acute as when it appears as a complication, nor is it so frequently attended by convulsions; although the stupor or coma may be as profound, and the organs of sense as much affected.

54. (f.) Effusion into the cavities of the chest is generally preceded by *anasarca*, by congestion or inflammation of the lungs or pleura, or of both; and is sometimes attended by *œdema* of the lungs, and by effusion into the pericardium. The affections of the lungs and pleura, with effusion, are the most frequent internal complications of the *anasarca*, or remote consequences of the renal obstruction; effusion into the peritoneum being very much less common. The associated affections of the lungs and pleura are generally far advanced before they are fully manifested — are more or less latent in their early stages, and are seldom confined to one side, although one lung or pleura may be more diseased than the other. Dropsical effusion into the peritoneal cavity is generally preceded by *œdema* or *anasarca*, being in some instances an association of the latter; or

by diarrhoea. It is occasionally attended by signs of inflammatory irritation of the membrane, but these signs may have been wanting or obscure, although indications of general peritonitis with effusion are found upon dissection; the early supervention of effusion probably removing the more severe local symptoms, as well as partially resolving the attendant inflammatory state.

55. (g.) *Renal disease and dropsy*, as sequelæ of scarlet fever, may occur in patients of any age; but much more frequently in *children* from two or three years of age up to thirteen or fourteen. They are most common in the ill-clothed and ill-fed, and in those who live in low cellars or on ground floors, and in cold damp situations, or who are exposed to cold or vicissitudes of weather soon after or during desquamation. They are much more rare in the children of parents in comfortable circumstances than among the poor; from a fourth to a third or even more of the cases of the latter being probably thus attacked, especially in some epidemics, and late in autumn and beginning of winter. There is probably hardly a case of dropsy after scarlatina, or of inflammation of an organ or serous surface, particularly when associated with dropsy in connection with this disease, that has not its origin in renal obstruction, although the interrupted functions of the skin, and the antecedent states of the blood, caused by the infectious miasm, may be admitted as concurrent causes. The kidneys are, however, so generally implicated, as I have contended above (§§ 24, 28. *et seq.*), in all the stages of scarlatina—both primary and secondary—as to allow the inference, that the affection of these organs may exist in a grade sufficient to occasion indications of its presence, if attentively enquired after, and especially the symptoms mentioned above (§ 49.), with more or less alteration of the quantity, appearances, and constituents of the urine, without producing such obstruction of this excretion, or such change of the constitution of the blood, as to be followed by dropsical effusion, this result supervening chiefly in the more acute and complete states of the affection of these organs. The consecutive inflammations, so frequently associated with the dropsy, also chiefly depend upon the renal obstruction, aided however, as just stated, and as already more fully shown (§§ 44, 45.), by the states of the skin and antecedent alterations of the blood.

56. (h.) The renal and dropsical affections consequent upon scarlatina, especially when severe, are often followed, during convalescence from them, by more or less *anæmia*; the alteration of the constitution of the blood—the contamination of the blood, directly and indirectly, by the infectious miasm, and consecutively by the obstructed emunctories—not only impairing the vital crisis of this fluid, but also hastening the changes in, and the destruction of, the red-globules or hæmatoglobulin, whilst the primary and secondary functions of assimilation—the formation of healthy chyle and the conversion of chyle into blood, or of the chyle-globules into blood-globules—are slowly and imperfectly accomplished, owing to the debilitated state of the several assimilating organs.

57. (i.) *Inflammation*, generally of a diffusive or asthenic kind, and attended with more or less effusion of a turbid serum, when the serous

surfaces are implicated, not infrequently is associated with the consecutive dropsy; but it also, although much more rarely, occurs independently of any antecedent or attendant œdema or anasarca. When thus complicated, and even when occurring simply, it is generally owing to the state of the blood, arising, as shown above (§§ 43. *et seq.*), from the primary and consecutive changes of this fluid, and the existing disturbance of the urinary and cutaneous excretions. The organs and surfaces which are most liable to be thus secondarily inflamed, either in connection with, or independently of, dropsical effusion, are the *membranes* of the *brain*, the *lungs* or *pleura*, or *both*, the *pericardium*, the *peritoneum*, the *synovial membranes*, the *parotid glands* and the *integuments*; and it is not rare to find not merely one, but two or more of these to be affected in the same case, more especially when the affection is associated with *dropsy*, and with manifest disorder of the *kidneys*, and with *albuminous* or otherwise *morbid urine* (§§ 60. *et seq.*)

58. (k.) *Enlargement and chronic inflammation* of the *parotid glands*, with effusion of serum, lymph, and puriform matter into the surrounding *cellular tissue*, and engorgement or inflammation of the *lymphatic glands*, are amongst the most frequent sequelæ of scarlet fever, and are often associated with œdema or anasarca, or with inflammation of the organs and parts just enumerated, and not infrequently with chronic disease of one, or of both ears, producing offensive discharge, perforation of the tympanum, and caries of the bones of the ear. *Chronic otitis* following scarlatina is generally of long continuance, sometimes occasioning caries of the mastoid cells and process; and even more extensive disease of the temporal bone. In some cases the disease extends to the membranes and sinuses of the brain, and even to the brain itself, as shown at another place (see art. *BRAIN*, §§ 58, *et seq.*); but these results seldom supervene until after several months, or even years.

59. IV. STATE OF THE BLOOD IN SCARLET FEVER.—Notwithstanding the chemical analyses, which have been made in Germany and France, of the blood taken from the subjects of scarlet fever, it is doubtful if any real or useful progress has actually been made in this department of pathological research during the last century and a half. The analyses, especially as regards this fever, have been few, and the results, in connection with the visible appearances and physical states of the blood, and with the stages and state of the disease, have not been stated with [the least degree of precision. As regards the appearances and physical states of the blood, it may be remarked, that these depend upon the type of the fever, or the states of vital power and vascular action, and vary most remarkably with these states, as observed in other fevers and maladies attended by contamination of the circulation, and as described in the articles *BLOOD* (§§ 115. *et seq.*), *FEVER* (§§ 93, 110, 520.), and *PUERPERAL FEVERS* (§§ 215. *et seq.*). It is chiefly in the more inflammatory types of scarlet fever that blood has been taken and its appearance observed. In the more malignant forms blood has rarely been taken from a vein, and on the few occasions on which this has been done, it has presented similar characters to those stated above (§§ 43, 56.), and to those mentioned in connection

with the fevers just referred to, and in the article BLOOD (§§ 78, *et seq.*). ANDRAL and GAVARRET analysed the blood of three persons in scarlet fever, and LECANU in two cases; but the results which these analyses furnish are not materially different from those obtained from the analysis of the blood of a healthy person. It is chiefly in the more malignant, or putro-adyamic type, and in the advanced course of the malady, that the blood presents morbid appearances such as are stated in the articles referred to; but in these circumstances it has not been chemically examined.

60. V. THE URINE.—The *urine* in scarlet fever presents the most important changes as respects the pathological states characterising the several stages of the disease, and as regards the treatment of these states. These changes are various, not only in different cases, but also in the same case at different periods, and even in the course of a few hours, and hence have arisen the opposite or varying statements respecting this excretion which have hitherto appeared. The appearances and constitution of this fluid, moreover, have been very imperfectly investigated during the early stages of the malady; and the symptoms connected with the kidneys at these periods very insufficiently investigated, if not entirely overlooked, by most observers and writers on this disease.

61. The *urine* is always paler in children than in adults, and hence the deep colour of it in the former should attract more particular attention when observed in them — the most frequent subjects of scarlatina. — (a.) The *urine* at the commencement, and during the early stages of scarlatina is always scanty and very high-coloured, and often of a deep-red hue when there is much fever. It generally has an acid re-action in the *mild* and *inflammatory* or *sthenic* forms of the disease. In the *septic* or *asthenic* types, and especially when the affection of the throat or the eruption presents malignant characters, the *urine* is either neutral or alkaline and very turbid; sometimes it contains blood-globules; and is always very scanty, although in these, as well as in the more *sthenic* forms, it is voided frequently, or is attended by dysuria or scalding. In most instances, even very early in the disease, it rapidly becomes ammoniacal; but, in the more malignant states, it deposits a viscid whitish sediment at an early period, consisting of the earthy phosphates and mucus, and it contains urate of ammonia and uric acid. When the *urine* is of a dark-brown colour and turbid, or deposits a loose sediment of this hue, the presence of partially decomposed blood-globules in it may be inferred. Albumen is also sometimes present in the early stages, but in various or slight quantity; and it may be detected, or even be considerable, at one period, and not be found some hours afterwards, and yet be soon again present.

62. (b.) During the *advanced* stages of the *mild* and more *sthenic* forms of scarlatina, the *urine* becomes more abundant, of greater specific gravity from the abundance of saline matters, and presents the characters usually observed during the decline of inflammatory and continued fevers. In *asthenic*, *septic* or *malignant* cases, the *urine* becomes, with the progress of the malady, of a dark brown or yellowish colour, is very scanty, and of a specific gravity varying from 1020 to 1025. It has an alkaline reaction, with a disagreeable ammoniacal

odour, and it occasionally contains blood and mucus, or partially dissolved hæmato-globulin, either diffused or in flocculent deposits, but rarely any or much albumen. It throws down a dirty white sediment consisting of earthy phosphates, urate of ammonia, urate of soda and mucus, with other animal matters. In these cases particularly, and less rapidly in others, the *urine* becomes more decidedly ammoniacal and offensive.

63. (c.) When the disease is *complicated* in the *early* stages or in its *advanced* progress, the *urine* is even still more changed from the natural state than above stated. If the attack be malignant or complicated from the commencement, and more especially if there be coma, or signs of inflammation of the lungs, pleura, or other internal organ or surface, with or without effusion, or external œdema, or if these complications occur in the *latent* and *non-eruptive* forms of the disease, the *urine* will be either *bloody*, or *albuminous*, and scanty, or it will be found to have been for some time previously either altogether *suppressed* or remarkably scanty, and high-coloured or bloody. Sometimes it appears like to the washings of meat, and is voided either frequently or involuntarily; and in others *hæmaturia* is decidedly present. In some cases *urine* has not been passed for many hours, and yet little or none has appeared to be retained in the bladder, indicating an arrest of the secreting function, owing either to suspension of the organic nervous influence of the kidneys, or to extreme congestion, or to both. In these cases, aching in the loins and lower limbs, nausea and vomiting, with general turgescence or œdema, headache, &c. may, or may not be present, with one or more of the complications described above (§§ 27. *et seq.*); but the pain and aching of the loins and limbs are not so great as usually observed in acute suppurative nephritis, although sufficiently indicative of suspended function and congestion of the kidneys, especially when viewed in connection with the state of the *urine* and the sympathetic phenomena. The connection of the renal affection, of the morbid and deficient *urine*, of the states of the blood and of vascular action, and of the consecutive inflammatory irritation, serous effusion, &c. with each other, and even the usual procession of these diseased states, in the course of scarlet fever, will be more readily understood, by a due and practical consideration of this topic, and of what I have already said respecting it (§§ 28. 41.).

64. (d.) During *desquamation* the *urine* generally contains albumen. SIMON remarks, that observations regarding the presence of albumen during this period are so contradictory as to render it a matter of interest to have the matter settled by further researches. “We have dropsical symptoms with albuminaria, dropsical symptoms without albuminaria, and albuminaria without dropsical symptoms. SOLON found albumen in the *urine* in twenty-two out of twenty-three cases of scarlatina. On the other hand, PHILIPP observed in Berlin at least sixty cases in which albumen was not detected.”

65. In most cases, the *urine* is of a straw-colour in this stage, contains mucus-corpuscles, and is turbid owing to this circumstance, and to the quantity of epithelium, either in single scales, or in fragments of a connected series of scales, swimming in it. The sediment contains much

epithelium, occasionally formed by lymph into cylindrical fibrinous casts of the tubes, and crystals of lithic acid. These changes arise from the desquamation of the uriniferous tubes, and are sometimes antecedent to the desquamation of the cuticle. This early desquamation of these tubes furnishes a proof of the earlier and more constant affection of the kidneys than has hitherto been supposed; and is evidence of the important part performed by the pathological conditions of these organs at the commencement of the malady for which I have contended (§§ 28. *et seq.*). In favourable circumstances no albumen is found in the urine, in most cases, during desquamation and convalescence, or the quantity is slight. But it is found in small or moderate quantity, in a few instances, without either inflammation or œdema or dropsy in any form being present. In some of these a slight febricula is observed, and soon passes off without either of these results. When, however, dropsy or inflammation follows scarlatina, the urine becomes albuminous generally with, or previously to, the febrile symptoms ushering in, during convalescence (§§ 49.), the dropsy or inflammatory affection, and continues to present this state, more or less manifestly, during the persistence of these sequelæ. It is often most remarkable in those cases of dropsy or inflammation which are consequent upon the latent and non-eruptive forms of the disease; and is sometimes further attended by disease of the glands of the neck. When the urine becomes very albuminous during desquamation and convalescence, then acute febrile symptoms, and inflammation of some internal organ or part, or dropsical effusion, or both, either pathological state preceding the other, soon supervene, and rapidly assume a severe or dangerous form. The urine during this stage often contains an increased quantity of the animal extractive matters usually existing in this excretion.

66. VI. APPEARANCES AFTER DEATH. — These differ remarkably, according as this issue takes place at an early or an advanced stage, and more especially according to the nature of the local affections complicating or following the disease. — In the malignant form, decomposition follows dissolution sometimes with remarkable rapidity. — A. When death occurs at an *early period*, (a.) the *surface* of the body appears either of a livid or of a violet-coloured hue, generally in patches, when the eruption was present; but not infrequently all traces of the exanthem have disappeared. Upon dividing the integuments, the vascular rete is usually found more than commonly injected, and the subjacent cellular tissue is less turgid than during life. — (b.) Generally also the redness of the *mouth* and *pharynx* disappear after death. The *tonsils* present different states according to the prevailing type of the disease. They are frequently enlarged, softened, pultaceous, or gangrenous; and sometimes they are covered by a soft membranous exudation. The mucous surface of the *pharynx* and *œsophagus* is considerably softened, and that of the former is occasionally ulcerated, softening and infiltration of the adjoining parts being manifest. The *palate* sometimes is partially destroyed by sphacelating, or septic ulceration, especially when the tonsils are gangrenous, or the pharynx ulcerated and softened. — (c.) The *digestive mucous surface* varies with the character of the fever. In the more asthenic or malignant cases, it is softened, discoloured, and

readily detached. Generally BRUNNER'S glands are more developed than natural, and the agminated glands of PEYER more tumid. The *mesenteric glands* are only occasionally enlarged and more vascular. The *spleen* is frequently enlarged, softened and friable; sometimes it is almost pultaceous. The *liver* and *lungs* are often more or less congested; and the *blood* found in the auricles of the heart and veins is dark, semi-fluid or grumous; and, in the malignant cases especially, this state of the blood is still more remarkable. The bronchial mucous membrane is injected with dark blood, and the *bronchi* often contain some mucus. — (d.) The *kidneys* are always congested, tumid, and often of a dark mottled hue externally; whilst an increased vascularity, varying in degree, in the different structures, is found at this period of the disease, upon dividing the organ longitudinally. The urinary *bladder* is commonly contracted, and contains little or no urine.

67. B. When scarlatina presents any of the *primary complications*, or prominent affections mentioned above (§§ 27. *et seq.*), during the second stage especially, the appearances are very different from those just stated; for, whilst those exist more or less manifestly, others are superadded. — (a) If the patient have been the subject of cerebral complications, the *membranes*, and even the *substance of the brain*, present increased vascularity, with some serous effusion between the membranes, especially at the base of the brain, and in the ventricles, particularly in those cases in which the urine has been very scanty or suppressed. — (b.) When the patient has been suddenly destroyed by the extension of the pharyngeal disease to the epiglottis, *larynx* and *trachea*, considerable œdema of the glottis, between the chordæ vocales, &c., and general tumefaction of these parts, sometimes with the effusion of a dirty friable lymph upon the surface, partially detached, or but slightly adherent, and occasionally spreading down a portion of the trachea, are observed. This state of parts was seen by me, at an early period of my practice, in a man, aged about 60, who died of scarlatina with sore throat in twenty-four hours from the commencement of the disease, owing to the extension of the local affection to the larynx. In these cases the *lungs* are always found remarkably congested with black fluid blood, and the surfaces of the *bronchi* are dark or livid, and injected, the tubes often containing a bloody mucus. — (c) When the *parotids* are much enlarged, and the neck tumid, and the surrounding *cellular tissue* is the seat of asthenic or spreading inflammation, then these glands, and generally the *lymphatic glands*, are found enlarged, injected, and softened, and the adjoining cellular tissue is infiltrated with a sanguineous serum, or lymph, or puriform matter; each of three several kinds of morbid effusion predominating in different parts of the neck in the same case. If the patient have lived a few days, the morbid fluids infiltrating the cellular tissue have sometimes contaminated, and ultimately destroyed the vitality of this tissue; until the sphacelation which results has left the muscles and vessels of the neck almost as if dissected, and has even spread to the sternum. In a case to which I was called, the gangrene advanced as far as the pectoral muscles; but death generally takes place before disorganization proceeds so far as this. The changes observed in the *ear* and its

vicinity have been already noticed (§§ 32. 46.); but these are chiefly of the nature of spreading inflammation along the Eustachian tube to the internal ear, and sometimes also to the mastoid cells, cochlea and semicircular canals, and are occasionally remotely followed by disease of the bone containing these parts.

68. (d.) When *pneumonia* complicates the disease both lungs are generally affected, although in different degrees, and the appearances vary somewhat with the type of the fever. Most frequently the lungs present in various grades, in different parts, but most remarkably in the posterior aspect, congestion with effusion of a serous or fluid lymph, or with a more firm lymph in some places, giving rise to varied grades of splenization, death or recovery taking place before the change can proceed further. The *pleura* is frequently either decidedly inflamed, or contains fluid with or without manifest inflammatory changes; and often in connection with pulmonic congestion or inflammation. In the more sthenic forms of the disease, lymph, in some instances, is exuded, with or without, most frequently with, serous effusion, and sometimes with adhesion of the opposite surfaces by bands of fibrinous lymph, or more continuously. —(e.) In the asthenic or malignant states, the marks of inflammation are less obvious, but the effusion into the pleural cavities is greater; and similar changes are sometimes observed also in the *pericardium*. —(f.) Inflammatory appearances, generally with a turbid serous effusion, and occasionally with slight or partial adhesions, are sometimes found in the *peritoneum*. —(g.) The synovial membrane of the *joints*, in a few instances, has presented marks of inflammatory action, with more or less effusion into its cavity.

69. C. When death occurs during desquamation or subsequently, owing to either of the *sequelæ* — or secondary complications — noticed above (§§ 41. *et seq.*), the appearances differ but little from those just mentioned, with reference to their respective affections; excepting that they either consist, in great measure, of dropsical effusion of greater or less extent and amount, or are associated with other lesions of an inflammatory, congestive, diffusive, or of a mixed kind. —(a.) The most frequent changes exist in the *kidneys* and in the shut *cavities* and *cellular tissue*, in the form of effusion, often with inflammatory appearances. The *kidneys*, in the more rapidly fatal cases, and in those which occur at an early period of desquamation, are frequently injected, or congested, mottled or marbled externally; and, internally, the constituent tissues present various appearances, certain of them being very vascular, others pale or anæmic. Hence the substance of the organ often is mottled, and generally not much increased in bulk, unless when the congestion and vascularity predominate. On examination by the microscope, the Malpighian bodies are often seen to be pale, and the surrounding capillaries injected, whilst the tubuli are filled with epithelium cells or scales. In those cases, in which dropsy occurs later in the course of recovery, and which are of longer duration, the *kidneys* generally present somewhat different appearances, which more nearly approach those observed and described in the articles DROPSY (§ 13.), and KIDNEY (§§ 23. *et seq.*), when treating of the changes connected with *albuminuria*. Although the surfaces of the organs are sometimes

mottled, and more or less congested, their structures, on division, are pale, especially in spots, as if anæmic, or from the deposition of lymph or albumen, and approach the characters of granular degeneration. The Malpighian bodies and the surrounding capillaries appear pale and bloodless under the microscope, and the tubuli are filled, in various places, with epithelium cells, and in others with what appears to be a mixture of albuminous matter or lymph, and oil-globules, or of these with detached epithelium.* —(b.) As respects the *cellular*

* After this article was sent to, and whilst it was passing through, the press, Dr. G. JOHNSON's very excellent article on the kidney, in the *Cyclopædia of Anatomy and Physiology* (Art. *Ren*), was brought to my notice, as well as his valuable paper in the Transactions of the Medico-Chirurgical Society (vol. xxx.), in both which places the morbid anatomy of the kidneys after scarlatina is ably described. Dr. G. JOHNSON, who was the first to detect oil or fat in the kidneys, in granular disease of these organs, states that he has not found oil in the urinary tubes after scarlatina. I observed some oil-globules in two cases of a more than usually chronic duration, as stated above; but Dr. JOHNSON, who has examined more of these cases than I have, without meeting with this change, justly considers the scarlatinal affection of the kidneys as very distinct from the granular disease of the kidneys described by Dr. BRIGHT; and whilst he denominates the former "*acute desquamative nephritis*," he terms the latter "*fatty degeneration of the kidneys*." I believe that the more acute or rapidly fatal cases of dropsy or inflammation after scarlet fever rarely present any oil-globules in the urinary tubes; but that, when the scarlatinal nephritis becomes chronic, and is followed by change of structure, then oil-globules are found in the tubes. In one of the cases in which I observed them after scarlatina, the man who was its subject was between 30 and 40 years of age, and was probably irregular in his habits; the consequent anasarca having been of considerable duration.

"*Acute desquamative nephritis*," of Dr. G. JOHNSON, occurs frequently as a consequence of scarlatina, and is occasionally produced by other animal poisons, as that of typhus fever, small pox, or measles. I have noticed, in the article KIDNEYS (§ 56. *et seq.*), the connection of this form of nephritis, which I have named "*consecutive, or secondary asthenic nephritis*," with febrile and other diseases, and the various circumstances of this connection. In relation to scarlatina, I have contended above that it occurs either *primarily* or *secondarily*; and that often there is thus a "*primary scarlatinal nephritis*," and a "*secondary scarlatinal nephritis*," (see also art. KIDNEYS, § 56.), or inflammation of these organs either associated with the scarlatinal fever, or occurring as a consequence of this fever. Dr. G. JOHNSON describes the nephritis *consequent upon scarlatina* as follows:—"The kidney in these cases is enlarged, apparently by the deposit of a white material in the cortical substance; the vessels in the cortical portion where they are not compressed by this new material, are injected, and of a bright red hue; the medullary cones are of a dark red colour, in consequence of the large veins which occupy these portions of the gland being distended with blood. The appearance of the entire organ is quite that of a part in a state of acute inflammation."

"When the kidney has been in a softened condition before the occurrence of the inflammatory disease, as often happens in elderly persons, the lobules on the surface appear larger and coarser than natural; the veins being less compressed than when the natural texture of the kidney is firmer and more unyielding, are much distended with blood, so that the entire organ is of a dark slate colour."

"On a microscopical examination the convoluted tubes are seen filled, in different degrees, with nucleated cells, differing in no essential character from those which line the tubes of the healthy gland. The Malpighian bodies are for the most part transparent and healthy, but the vessels of the tuft are sometimes rendered opaque by an accumulation of small cells on their surface. Some of the tubes contain blood, which has doubtless escaped from the gorged Malpighian vessels. There is no deposit exterior to the tubes."

"The condition of the urine in these cases is clearly indicative of the process going on in the kidney. After it has been allowed to stand for a short time, a sediment forms; and on placing a portion of this under the microscope, there may be seen blood-corpuscles, with epithelial cells in great numbers, partly free and partly entangled in cylindrical fibrinous casts of the urinary tubes, and

tissue and the serous cavities, it need only be added, that the former is generally more or less loaded with serum, the latter sometimes contain effused fluid with, or without, slight or marked inflammatory appearances, although these latter are not so frequent or so marked as in the primary complications noticed above (§§ 27. *et seq.*). The effusion, as well as inflammatory changes, may exist only in one of the cavities, or may extend to two or more. Both pleural cavities are generally implicated, but sometimes in different degrees; and the parotid and lymphatic glands are often enlarged, and the joints occasionally inflamed.—(c.) I have likewise seen the vertebræ of the neck, their ligaments and intervertebral substance seriously affected, caries of the former with chronic inflammation, thickening, &c. of the theca supervening and occasioning cervical paraplegia or general palsy (§ 47.).

70. VII. DIAGNOSIS.—Scarlatina can be confounded only with measles (*Morbilli*), or with the mixed or hybrid disease which I have described by the name of *Rubeola*.—A. Dr. R. WILLIAMS has stated that the earlier appearance of scarlatina after exposure to infection, and of the eruption after the primary fever, may serve to distinguish this disease from measles. But, although these circumstances frequently obtain, and may be viewed as the law, still the exceptions furnished by different epidemics and by individual cases are so numerous, that but slight importance should be attached to them. This will be still more apparent upon referring to what I have adduced respecting the periods of *latency* in these maladies in the article on INFECTION (§§ 31, 32.). The appearances of the efflorescence in both maladies, and the signs furnished by the inlets to the digestive and respiratory passages, and the states of the urinary functions are chiefly deserving attention in establishing a diagnosis between *scarlet fever* and *measles*. In the former, the tongue presents redness of the point and edges and strawberry surface, and the fauces more or less redness at an early period, whilst the tonsils are enlarged or soon afterwards are ulcerated. There is seldom, or very rarely, sneezing or coryza, both which usher in measles; and in the latter, the affection of the throat is either altogether absent or very slight, whilst cough is often severe. The period at which the eruption appears differs much with the constitution of the patient, the season, and character or type of the prevailing epidemic, as regards both maladies; and although deserving of mention as respects the description, cannot be depended on in the diagnosis. In scarlatina the patches are large, and the surface covered by them generally ample; but in measles the eruption consists of small circular dots like flea-bites, and when most confluent the patches or clusters are small. The colour of the rash is that of a vivid red in scarlatina, whilst it approaches a raspberry hue in measles. The former can hardly be mistaken for *roseola*, which is preceded by very little fever, and rarely by any

affection of the throat; and the rose-coloured and irregular spots of which differ much from the large patches of scarlatina. In most cases, the eruption of scarlet fever is more general than that of other exanthematous diseases; whilst the fever is more persistent, and does not abate with the development of the eruption, and but slightly, or not at all, with the disappearance of it, but often continues many days, or even some weeks afterwards; or is sometimes considerably exacerbated after having abated. In measles, the fever usually subsides with the disappearance of the rash.

71. B. The kidneys are not nearly so liable to be affected in measles as in scarlet fever, in which they are remarkably disordered, both primarily and secondarily, and the urine is either partially or altogether suppressed or otherwise morbid. The infectious miasm of scarlatina has a special influence on the states of the kidneys, as shown above (§§ 28. *et seq.*), and thereby often induces several secondary affections not observed to follow, or very rarely, the other exanthematous fevers, more especially dropsies, diffusive or congestive inflammations with serous effusion, &c., affections of the joints, gangrenous erysipelas, &c.

72. C. The diagnosis of the primary fever of scarlatina is often difficult or impossible, if the anginous affection be absent, and if no eruption have appeared. The circumstance of the disease being in the same family, house, or immediate vicinity; the states of the tongue, throat, flexures of the joints, and urinary excretion, and the character or type of the fever will sometimes aid the diagnosis; although the severity of the disease, the affection of the head, the convulsions or delirium, the vomitings and thirst may lead to the belief that the first stage of meningitis is actually present. In most cases, however, of this period of scarlatina, the severity of the vomiting; the pains in the back and loins; the remarkable scantiness and morbid appearances of the urine; the burning heat and dryness of the skin; the enlargement of the parotids, or the existence of some complication; the great rapidity of the pulse, and the acuteness of the attack, should induce suspicions of scarlatina, especially in the circumstances just mentioned, although neither eruption nor throat-affection is present (see above § 4., and art. MEASLES, § 48.).

73. VIII. PROGNOSIS, &c.—It has been attempted by some writers to impart an *ad captandum* precision to the prognosis of scarlet fever that the subject does not admit of, by calculating the proportion of deaths in this disease. But it is obvious that the rate of mortality will vary with the several forms, types, complications, &c.; with the combinations of predisposing causes, and with the treatment.—A. In the simple, mild, and more sthenic types of the malady, the prognosis is favourable, although the contingency of secondary disease should be taken into account, yet this may be generally guarded against and prevented. When the malady is complicated, irregular, malignant or asthenic, then the danger is considerable, although numerous circumstances may indicate either a diminished or an increased risk. It is chiefly from the existence of certain symptoms that danger is to be inferred; but there are circumstances connected with the pre-existing state of the patient which often increases the risk, as the first period of *dentition*, the period of *weaning*, the *cachexia* produced by unwholesome or insufficient food; a bloated,

very commonly numerous crystals of lithic acid are present.

“As the disease subsides, which under proper treatment it usually does in a few days, the blood, fibrinous casts, and epithelial cells diminish in quantity, and finally disappear; but traces of the casts may be seen some days after the urine has ceased to coagulate, on the application of heat or nitric acid.”—(*Cyclop. of Anat. and Physiol.* art. *Ren.*)

leucophlegmatic or plethoric habit of body, and the *pregnant* and *puerperal* states. In some epidemic visitations, and in some seasons, more than in others, pregnant and especially puerperal females are liable to be attacked by scarlatina; but the liability is not so great as the danger to those who are infected; for the *pregnant* are prone to abortion, and when this occurs the disease often assumes a most dangerous form; and if the disease occurs soon after *parturition*, recovery rarely takes place, more especially as observed in some epidemics. In these latter circumstances the scarlatina often assumes the appearances of, and can hardly be distinguished from, the most malignant form of puerperal fever. Scarlatina thus occurring soon after *parturition* has been described as follows by MALFATTI:—“It usually attacked patients immediately after delivery, and caused the utmost prostration of strength, and slight pain in the throat. The eruption assumed either the miliform or levigated character, and was of a dark violet hue. The strength of the patient now sank rapidly, and to a burning heat succeeded coldness of the extremities, and a very frequent and small pulse. To these symptoms were added great anxiety, hæmorrhage from the nose, and a fœtid and copious lochia.” He adds, that the infected, in this state, all died, “*qualiscumque adhibita fuerat medela.*”

74. *B.* The *symptoms* which more especially indicate danger are the occurrences of convulsions at or soon after the attack, or of delirium on the first and second day. In these cases the child often dies, as remarked by Dr. R. WILLIAMS, on the third or fourth day, and the adult on the eighth or tenth; but this issue sometimes in these takes place even earlier, more rarely later. A severe affection, or sphacelating or foul ulcerating state, of the fauces and tonsils; a brown state of the tongue, or a clean, raw tongue, or a glossy state of the tongue or throat, with a rapid fluttering pulse, are very unfavourable symptoms; as also is a sudden fading of the eruption, or the changing of it to a livid hue; or the appearance of petechiæ or of purple spots. The supervention of coma, or of pericarditis, or of double pneumonia, or pleuritis, or peritonitis, is unfavourable, but not necessarily fatal; but the danger of these, as well as of all the other primary and secondary complications of the malady, is remarkably heightened by suppression of *urine*, or by a very scanty or bloody state of this excretion, and by other indications of serious affection of the *kidneys*. Persistent vomiting, a severe or obstinate diarrhœa; acrid or excoriating discharges from the mouth, throat, and nostrils, with or without hæmorrhages; hæmaturia, or melæna; the association of two or more of the complications or local affections already described, especially in a severe form; the appearance of diffusive inflammation of the cellular tissue in the vicinity of the parotids, and extending down the neck, or of extensive abscesses, or sphacelation, in this situation, are very unfavourable occurrences. The same may be said of affections of the joints, erysipelas or local gangrene, and affection of the cervical portion of the spine, with consecutive caries of one or more cervical vertebræ. But these are not necessarily fatal, although very dangerous; even from the last of these lesions, recovery may take place, a result which was obtained in two

cases which were under my care, both of which are now alive and quite well, excepting a stiff and shortened neck.

75. *C. Dropsy*, in the form of anasarca, or taking place in any of the cavities, in connection with scarlatina, varies much in danger, with the season and the prevailing epidemic, with the seat of effusion, with the nature of other associated morbid states, and more especially with the states of the kidneys and urinary excretion. The occurrence of anasarca *during the eruption*, or of effusion in any shut cavity, at this period, with or without inflammation, is an indication of danger, more especially if the urine be very scanty, very deep-coloured, or suppressed. Anasarca occurring alone *during desquamation or convalescence*, although the urine is albuminous is generally cured, if no further complication take place, and if the urine is not very scanty, or very albuminous, or bloody. But if the urine assume either of these states in a remarkable degree, the supervention of most dangerous internal effusion or inflammation, chiefly of the meninges of the brain, of the pleura, pericardium, or peritoneum, or of the lungs, &c., may be expected. The danger and the frequency of these secondary complications of scarlatina, as well as of the primary associations, vary much in different epidemics, and with the numerous causes or occasions concurring to render the infection intense, or to reinforce the operation of the poisonous miasm, and with those more especially which are about to be mentioned (§§ 84. *et seq.*).

76. IX. CAUSES. — i. THE SPECIFIC CAUSE, OR POISON. — *A.* Scarlet fever is caused by a *miasm* or *emanation* from a person already the subject of this disease; but the exact and intimate nature of the miasm, and the origin of it, are unknown; we know only the effects or phenomena which this cause produces, and most of the circumstances which favour its operation; and we further know, that, however these effects vary in severity, in form or in character, they are always of a specific nature; the seminum attending them multiplying and disseminating itself, and spreading its kind, whenever circumstances favour the propagation. Upon these circumstances, the prevalence of the malady chiefly depend; for they favour the operation of the specific poison or infectious miasm which produces it,—1st, by predisposing the system of individuals to the invasion of this miasm,—2dly, by concentrating and increasing the dose or quantity of the poisonous emanation invading the frame. During many ages, and especially when the earlier accounts of the malady were furnished, either the combinations of these predisposing circumstances were greater at distant intervals, or their absence was more complete in these intervals than at the present day, or the infectious or poisonous miasm was entirely absent, or remained latent or concealed, for prolonged periods. Either of these conditions may have existed; or the infection, having produced its effects on all who had come within its sphere, had ceased to spread, and had ultimately disappeared from a place for a longer or shorter period, until it was introduced by a poisoned or infected person, or by contaminated articles or fomites. This latter circumstance—this re-appearance of the malady in a place long entirely exempt from it, suggests the following questions as to its origin,—1st, Whether the disease is caused only by a specific seminum,

which had originated at some unknown period, and, having infected one and more persons, and subsequently all who were predisposed to the infection, had then ceased to produce its effects, but was retained by substances capable of preserving it under certain favourable circumstances, until it was again brought to act on those predisposed to its influence? — 2dly, Whether the disease is always thus perpetuated by the preservation of the infectious seminum by individual, or rare, or scattered cases, and by fomites; or is it produced, *de novo*, by the combination of those causes, in an intense form, which are usually viewed as concurrent and predisposing causes, and, being thus produced anew, is then propagated by the infectious emanation proceeding from those thus attacked?

77. I incline to the first of these opinions, because we have no sufficient evidence of the reproduction of this malady by the combination of the causes usually favouring it, predisposing to it, and rendering attacks of it malignant or complicated, and because an infectious seminum, as in the case of small-pox, may be preserved, propagated, and become epidemic — may almost disappear for a time, and then unexpectedly break out — without the means of its preservation, the sources of its infection, or the causes of its prevalence, and of its multiplied effects, being made manifest, or even admitting of solution, on many occasions. But the difficulty of tracing infection to its sources on all occasions, in this and in other infectious maladies, is by no means an argument against its existence; for causes are often inferred from their effects with greater certainty than from some other proofs upon which firmer reliance is often placed. The laws of infection, and the numerous circumstances connected with the sources, the preservation and the dissemination of infectious seminia, admit not of a rational doubt of the perpetuation of these seminia, although their effects may be sparingly or rarely disseminated, or even developed after long intervals. Indeed much of what is known of these favours a firm belief in this source of scarlatina, as well as of measles and small-pox, on all occasions and in all instances.

We know that the vitality of several kinds of seed may be preserved for many ages; and why should not the poisonous properties of an animal fluid or miasm be preserved for months, or even for years, when exclusion from the air and other circumstances favour the preservation? Admitting this, allowing also that the seminum often requires many days to take root and to develop itself into full efflorescence, knowing, moreover, the diversified media by which the morbid or poisonous emanation may be preserved, conveyed, and brought even into unrecognisable operation, it cannot be a matter of surprise that the source of infection frequently admits not of demonstration. Two powerful circumstances in favour of the existence and operation of a specific infection or poison have too frequently been kept out of view, namely, — 1st, the non-existence, or non-appearance, at any time of this disease in several secluded or isolated localities and islands, although the several causes tending to favour the dissemination and malignancy of the disease — those very causes which have been belived by some to be capable of originating the malady *de novo* — have been there present, in the most pregnant forms of union and association, — and, 2dly, the fact that, when the disease

has made its appearance in such places, it has always been traced to the introduction of infection, and, having exhausted itself on all the predisposed to it, has entirely ceased and disappeared for years, until again introduced by the infected or by fomites.

78. If we refer to what is known (and our knowledge in this and in other allied topics is very imperfect) respecting the statistics of disease in most of our cities and large towns, we shall find, that at no time are cases of scarlatina altogether absent. I believe, moreover, that cases often occur which are either not recognised at all, or not as cases of this disease. Hence sources of infection are rarely absent from these localities, irrespective of the chances of transport to, and transmission from them, or, if absent for some time in one place, they are present in other places, from which they are transmitted to those which have been for a longer or shorter time exempt from them, and which, from this circumstance, furnish subjects predisposed to infection.

79. *B. The media* by which this disease is transmitted from those affected to the healthy, are generally the atmosphere surrounding the sick, and substances which imbibe the miasms emanating from those who are, or have been, recently attacked, and which retain it for a time, but soon impart it to the air — *fomites* (see art. INFECTION, §§ 16, 17.). It has not been demonstrated, nor indeed does the matter readily admit of precise demonstration, how far the miasm of scarlatina may extend, by means of the atmosphere, from a person sick of the disease. Much will depend upon the state of the air as to humidity, motion, &c., and upon the predisposition of those exposed to it. It has been supposed, that the appropriation of a room in schools for such children as may be seized with either scarlatina or measles may prevent the spread of the disease among the healthy. This has been attempted in many instances; and by myself, in respect of these diseases on several occasions, and on two occasions with complete success, in others with partial but very considerable success. Much depends upon the size and construction of the building, and the strictness of the seclusion and of the precautions as to fomites. This measure failed in Heriot's Hospital, Ackworth School, and the London Foundling Hospital, where the buildings furnished excellent means of isolating the infected. But I suspect that the precautions taken failed in preventing the transmission of the infecting miasm by persons or clothes. Besides, when a school is large, some of its inmates may have been so long the subjects of the eruptive fever before the disease is recognised, as to have infected others previously to their removal. When the building furnishes the means of complete isolation, the attempt at thus preventing the spread of the disease should be made; for it is better that the infected should receive due attention in such circumstances at the place of infection, than that they should be returned to their friends, where they may transmit the disease to many others; and it is even better that those in the infected school, who have not yet sickened, should not be allowed to leave it, inasmuch as they may convey the disease in their persons or clothes to the families to which they would return.

80. *C. Fomites*, or substances impregnated with the miasm exhaled by persons sick of scarlatina, are

frequent media by which this disease may be transmitted to the healthy, either in the vicinity of the sick, or in places at a great distance. The *duration* of the period in which the capability of infection is possessed by fomites is uncertain, and it has not been ascertained. It may be inferred to be very short when the impregnated substances have been exposed to a free current of air; and much longer when they have been shut up and entirely prevented from imparting or losing the retained miasm. Feather beds and woollen bed-clothes retain the infection for the longest period, especially when undisturbed or shut closely up. The duration of the power of infection, in respect of these articles and of woollen body-clothes, has not been and is not likely to be determined; for various circumstances will either shorten or prolong the period. Dr. SIMS remarks "that the infection seemed to remain in a house some, but not many weeks, after all the family were recovered." In large airy houses, where ventilation and means of purification are adopted, a very few weeks may be considered sufficient to remove the infectious property; especially if the beds and bedding are subjected to a high range of temperature, as advised in the article on the *prevention of PESTILENCE* (§ 77.). But, where these means are neglected, and in close, dirty, and low apartments and houses, and in crowded localities and houses, where the beds, bed-clothes, hangings, &c. are foul, and insufficiently aired, the power of retaining and transmitting infection may exist for several, if not for many weeks. When fomites are shut up, and excluded from imparting the retained miasm, the disease may be thereby conveyed to distant or remote parts, and even without the source of infection or the media of transmission either being recognised or admitting of recognition.

81. *D.* The propagation of the disease by *inoculation*, and by the contact of the morbid secretions of the disease, has been demonstrated. Sir B. HARWOOD and others have tried to inoculate healthy children with the fluid from vesicles sometimes intermingled with the eruption of scarlatina, in hopes of producing a milder disease, as in small-pox; but, although the disease was thus communicated in many instances, no mitigation of its type was thereby obtained. In a case which came under my care, the disease was produced by the contact of a small portion of the discharge from the throat of a person with malignant anginous scarlatina, and the patient thus infected had the disease in the most severe form, and recovered with difficulty.

82. *E.* The *susceptibility* to the infection or contagion of scarlatina is exhausted or annihilated after the disease has run its course—after the scarlatinal poison has produced its specific effects. This law obtains as remarkably in respect of scarlatina as of small-pox. The impossibility of being infected by this malady a second time has been fully ascertained by Dr. WILLAN and many others; but a very few exceptions to the law have been recorded,—so few as not to amount to more than one instance amongst two or three thousands constituting the law. This immunity from a second attack may be viewed as a proof that the disease is not merely one of the blood alone, but is also, if not chiefly, one primarily affecting and changing the susceptibility of the organic nervous

system, the blood being altered by the state of this system, on the conditions of which this fluid is so intimately dependent.

83. *F.* The *coëxistence* of scarlatina with measles, with the vaccine disease, with erysipelas, and with small-pox, has been contended for by some, and denied by others. I believe in its coëxistence with measles, and in the production in consequence of the hybrid disease described under RUBEOLA; and its coëxistence with the other eruptive maladies just mentioned, especially vaccinia, is not unlikely to occur under circumstances favouring the operation of their respective poisons upon the frame at the same time. Dr. GREGORY states that he has seen at the Small-pox Hospital "several unequivocal cases of the simultaneous existence of small-pox and scarlatina anginosa." And Mr. MARSON, surgeon to that hospital, remarks that, in the course of eleven years, "he has seen seven persons who had variola and scarlatina simultaneously."—(*Med. Chir. Transact.* vol. xxx. p. 121.)

84. ii. *PREDISPOSING CAUSES OR CIRCUMSTANCES.*—The causes predisposing to the infection of scarlet fever are numerous, and may be referred to the *states of individuals* exposed to infection, and to the *circumstances or conditions* favouring the concentration and the invasion or operation of the poisonous miasm.—*A.* As the *mode* in which this disease is generally infected, whether the infectious emanation proceeds directly from the sick or mediately or by means of fomites, is by the inspiration of air contaminated more or less with the poisonous miasm, which affects, nearly at the same time, or in quick succession, the organic nerves of the respiratory surfaces and the blood distributed to these surfaces—morbidly impressing the former, and passing by endosmose through the latter—it follows that the susceptibility to infection must depend much upon the states of the organic nervous power, and of the vascular system, and that, when the energy of the one is impaired, and the action of the other is lowered, the frame will be more liable to be invaded by the poisonous influence. Hence some individuals are more prone to infection than others, and hence the same person is more predisposed at one time than at another, according to the varying states of nervous tone and vascular action. The conditions of the atmosphere, as powerfully modifying these states, have considerable influence in predisposing to infection; but to this and to the immediately preceding topic, I can add nothing to what I have stated in the article on INFECTION (see §§ 44—55.).

85. *B.* There is no cause of predisposition more generally manifested than the *age of childhood*. The susceptibility of infection appears to be greatest from the period of weaning to fully adult age. After thirty or forty years of age the susceptibility is remarkably diminished; but although I have seen several cases from thirty-five to fifty years of age, I have met with one only between fifty and sixty, and he died in twenty-four hours owing to the extension of the disease to the larynx. As the susceptibility of infection is greatest in childhood, and as the proportion of those who have had the disease at this epoch is very great, it follows that the number of non-infected at adult and advanced age is comparatively small. Although cases of the disease at these ages are thus few, yet they are generally of a most severe character,

especially about and after forty years of age, as respects not merely the complications, but also the type of the eruptive fever, from its commencement, and the danger is thus increased with advanced years. According to my experience, the younger the child the milder is the attack; but there are numerous exceptions to this law arising out of the aggravating circumstances connected with weaning and dentition, and the numerous *concurring predisposing causes*, observed among the poor—of which the most influential are, ill-clothing; insufficient and unwholesome food; low, ill-ventilated and malarious abodes; exhalations from cess-pools, privies, and sewers, and inattention to cleanliness, with various others tending to lower the constitutional powers and the vital resistance to the invasion of infection, to concentrate the infectious emanation, and thereby to increase the dose of the poison.

86. Infants during the period of suckling very frequently escape the disease, although every other member of the family may be attacked. I have seen, on several occasions, every one of a family of eight or nine children affected in a very short period of each other, and the infant at the breast to escape. The cause of this *comparative immunity* is not very apparent. Probably infants at this period are less exposed to the infectious emanation; but this depends much upon the circumstances of families; amongst the poor the exposure is not materially less. It is rather to be imputed to a less susceptibility of infection at this period, depending probably upon the circumstance of the infant being then nourished by a secretion directly from the secreting organs of the mother, and thus possessing some measure of an invigorating vital emanation, thereby enabling the infant to resist the infection. I have observed, in many instances, that persons who have experienced a very severe attack of measles, have escaped the infection of scarlatina, although much exposed to it. This circumstance is deserving of further observation; but, from whatever cause, some persons resist this infection, although frequently exposed to it from an early age. Out of 2614 cases recorded by Mr. FARR in his fourth report, 2419 were children, 182 adults, and 13 aged persons. Scarlatina may attack the *fœtus in utero*. Instances of this have been furnished by several writers. Dr. GREGORY states that, “on the 28th of April, 1839, his youngest child was born, evidently suffering from fever. The throat was affected the following day, obviously from angina maligna. Eruption was never developed. The infant drooped and died on the first of May.” (p. 146.)

87. C. Scarlet fever affects both *sexes* in equal proportions, and very remarkably so. In London it destroyed, in 1838, 747 males and 777 females; in 1839, 1241 males, and 1258 females; and throughout England and Wales, in 1840 (exclusive of the metropolis)*, 8927 males, and 8935 females. This disease appears to be most prevalent in temperate climates. It is stated to be comparatively rare in Bengal. Dr. GREGORY remarks that Dr. JACKSON, formerly of Calcutta, could not recal to mind any cases which he had

seen in India deserving the name of scarlatina. I never met with a case within the tropics. I believe that the disease has not yet been imported into Australia, Van Diemen's Land, and New Zealand. It was brought to North America in 1735, and its progress was very slow, but very fatal. The epidemic in 1746 in that continent was most pestilential. “Villages were depopulated by it, and parents had to bewail the loss of all their children.”

88. D. As to the *complete immunity* consequent upon an attack of this malady, it may be remarked that this is to be imputed to the exhaustion of susceptibility produced by this poison, as by several other animal poisons, as respects their several specific effects. That the poisonous emanation or material should fail of producing any effect upon a person who has, at some more or less remote period, been affected by it, is a most important law in this and other exanthematous and pestilential maladies, especially as respects the safety of the species. The protection thus obtained is the chief means of preventing the depopulation of

assigned in the returns; but they are sufficiently accurate to convey useful information.

Years.	Scarlet Fever.	Measles.	Small-pox.
1838	- 1524	- 588	- 3817
1839	- 2499	- 2036	- 634
1840	- 1954	- 1132	- 1235
1841	- 663	- 973	- 1053
1842	- 1224	- 1293	- 360
1843	- 1867	- 1442	- 438
1844	- 3029	- 1182	- 1804
1845	- 1085	- 2318	- 909
1846	- 928	- 747	- 257
1847	- 1433	- 1778	- 955
1848	- 4756	- 1143	- 1617

During eleven years, 20962 - 14632 - 13079

During the last eleven years the deaths, in the metropolis, from *scarlet fever* have been greater than from *measles*, or from *small-pox*, or from *hooping-cough*, or from *continued fever*. In only three of these years have the deaths by measles been greater than those by scarlatina; and in only two has the mortality from small-pox exceeded that of scarlet fever. In 1841 and 1846 the mortality of scarlatina and measles was low; and in the latter year that of small-pox was the lowest. In 1839, 1843, 1844, the mortality of both scarlet fever and measles was high. During 1848 the deaths from scarlatina were about three times greater than the average of the former years. The maximum mortality from measles occurred in 1845, and from small-pox in 1838.

The greatest number of deaths from scarlet fever occur among the poor owing to the circumstances, which both predispose to infection, and render the disease more malignant; and even those causes which develop the sequelæ of the disease and render them fatal (see § 42.) are also most prevalent in the lower classes. If the above amount do not comprise the deaths from dropsy, or other diseases consequent upon scarlatina, the mortality from this malady must have been greater than here stated. The above results will show that there are few diseases—perhaps none—from which the general amount of mortality, and of danger, is greater than in scarlet fever, and yet there is not one, of which the pathology and treatment has received less attention and elucidation in modern times than it.

The *proportion of malignant to mild cases* of scarlatina cannot be truly estimated, as it differs in different seasons, in different localities, and in different epidemic prevalences. Dr. WILLAN found it to be one of the former to four of the latter; and Dr. CLARK, one to two; and one of six had dropsy during convalescence. The *rate of mortality* must necessarily also differ with the above causes—the fluctuation sometimes observed being remarkable,—being from one in forty to one in six cases. Dr. GREGORY considers that the average mortality is about six per cent.; and that, while throughout England and Wales, 19,816 deaths occurred in 1840 (a year of average mortality for London) the total number of seizures must have amounted, according to this calculation, to about 330,266 in that year, for the whole of England.

* The following will show the comparative prevalence, in the metropolis, of *scarlet fever*, *measles*, and *small-pox*, from 1838 to 1848, both years included—during the last eleven years. It must be manifest that the numbers assigned can be an approximation only to the true amount, as the causes of death are in many instances arbitrarily

districts where any of these maladies break out; and accordingly it has been observed, that where scarlet fever, or measles, or small-pox has been introduced for the first time, or after the lapse of very many years, the whole, or a large proportion of the population being susceptible of infection, the destruction of human life has been there most terrific. That the immunity obtained, by an attack of those diseases which infect the constitution only once, cannot be imputed to any change in the blood consequent upon such an infection, may be inferred,—1st, from the impossibility of a permanent change in this fluid that could prevent the recurrence of any alteration in it which had taken place on some former occasion; and, 2dly, from the gradual and entire renewal of this fluid after longer or shorter periods, a renewal of susceptibility inevitably supervening, if this property resided in the blood. We must therefore refer the immunity from a second infection to the organic nervous system, and view the susceptibility of this system to have been so affected or specifically changed by the first operation of the poison as no longer to be capable of being roused, by any subsequent application of the same species of poison as previously affected it, to a similar series of morbid changes and actions.

89. *E. The Period of Latency or Incubation—the precursory or formative Period.*—The time which elapses between exposure to infection and the commencement of the febrile action, may be expected to vary much, as it actually does vary, according to the susceptibility of the individual either from constitution or from the influence of predisposing causes, or from the concentration or dose of the poison. I have stated much of what is known as to this matter in the article on INFECTION (§ 32.). All that can be advanced is, that the period is very uncertain. It may be only a few hours, or it may extend to ten or twelve days. Dr. MATON has recorded some cases in which he considered this period to have been prolonged to twenty-four or twenty-five days. The most common period is most probably three or four days, it being rarely shorter than two days, or longer than eight. In a case referred to by M. ROSTAN, in which the disease was induced by inoculation, seven days elapsed before the appearance of eruption.

90. X. PATHOLOGICAL INFERENCES.—It may be useful to conclude this view of the *pathology* of scarlet fever with certain inferences as to those topics connected with the nature of the malady, that have an important relation to the treatment of it, and that should furnish the basis of our intentions of cure.—*a.* The *cause* of scarlet fever appears to be an animal miasm or poison of a specific kind—a specific animal seminum reproducing itself to an indefinite extent.—*b.* It is not proved that this *seminum*, or specific form of fever, is generated, or appears *de novo*, from the combination of circumstances or states shown above to favour the extension of the malady; but, on the contrary, it is much more probable that the disease occurs only from the operation of this seminum, or specific infectious agent, proceeding either directly from a person labouring under the malady, or mediately by fomites which retain, convey, and communicate the seminum.—*c.* The *origin* or *source* of this seminum is not known; but very probably, like small-pox, the disease was

first generated by the lower animals, or occurred among them as a pestilence or epizooty, and not unlikely among the equine race, and was thence communicated to man—the seminum formed among these animals having effected the human species in circumstances favouring the extension of it from the former to the latter, among whom it has been preserved ever since.—*d.* The spread of the disease is favoured by certain *conditions of the air*, but what these conditions are is chiefly a matter of inference: a humid, close, and malarious atmosphere appears to favour the extension and operation of the poison; and all the other conditions shown in the article INFECTION to favour or to restrain the extension of infectious agents, exert similar influences in respect of this. Extremes of temperature seem to diminish the spread of the malady, and to render attacks of it more mild.—*e.* The states of those exposed to the morbid poison proceeding from the affected appear either to favour or to resist the action of this poison; and, when favouring it, very remarkably to modify its operation and effects (§§ 84. *et seq.*), conformably with predisposition, susceptibility, diathesis, temperament, and existing constitutional or visceral conditions; the susceptibility of a second infection by the seminum of the malady being annihilated by an attack.—*f.* The poisonous material infects the frame of the healthy in the manner fully explained in the article on INFECTION (§ 44. *et seq.*), and develops its effects in the course of a period, varying in duration from two to twelve days, or even in a shorter, but very rarely in a longer time, according to the susceptibility and predisposition of the recipient, and the concentration or dose of the poison (§ 76.).—*g.* The effects of the poison, like those of all morbid poisons, are exerted *primarily* upon the organic nervous system, and consecutively upon the vascular system and the blood; and as respects this malady especially, *secondarily* upon the *kidneys*, the *throat* and *skin*; either of these parts, or any two of them, or even all of them, evincing these effects, in a more or less manifest manner; these latter, or local effects constituting the specific characters of the disease.—*h.* The early affection of the *kidneys* in this disease, especially when the affection is such as to impede or to interrupt, or to altogether arrest the *urinary excretion*, produces a change in the blood, in addition to that already occasioned by the infectious agent acting either directly upon this fluid, or through the medium of the organic nervous system; the change in the blood thus produced often occasioning asthenic or diffusive inflammation of serous surfaces, or of predisposed organs, with serous, or sero-albuminous, or sero-fibrinous infiltration or effusion of a watery lymph—causing the several *primary complications* described above (§§ 27. *et seq.*), and already more fully explained (§§ 41. *et seq.*).—*i.* After this malady has run its usual course, it is more liable than any other exanthematous fever, to be followed during desquamation and recovery, —during a period varying from seven or eight days, after the fading of the eruption, to four, or even six weeks at the utmost,—by a consecutive affection of the *kidneys*, indicated by scanty, albuminous, or even bloody urine, and by the presence of epithelial cells in this fluid, sometimes moulded in the fibrine or lymph into the form of the urinary tubes, and consecutively by *œdema*, *anasarca*, or *inflammation*

of internal parts, or by effusion into serous cavities. — *k.* These *sequelæ* or *secondary complications* result from the consecutive affection of the kidneys (§§ 42. *et seq.*), which appears to consist chiefly of an obstruction caused by the accumulation of exfoliated epithelium in the tubuli and of a deposition of albuminous lymph in the structure of the organ, this latter obstructing the circulation in the capillaries by its pressure, whilst the accumulated organic detritus in the tubuli obstructs the passage of the secretion along these canals, and impedes or interrupts the function of the organ. — *l.* The consequences of the affection of the kidneys, at an early stage of the disease, and of the consecutive obstruction of these emunctories, at a much later period, are, as shown above (§§ 41. *et seq.*), morbid or contaminated states of the blood — a state of *excremential plethora*, consisting of an excess of watery elements and of effete, deleterious, and irritating materials, and saline ingredients. The accumulation of these *excrementitious matters* in the circulation, as well as of those *usually eliminated by the skin*, occasions the several complications—whether inflammatory or dropsical—observed in the course of the malady, or subsequently as *sequelæ* or *reliquiæ*. — *m.* Not the least important of these latter is the *anæmia* observed not infrequently to follow the renal and dropsical affections during or consequent upon scarlet fever. — *n.* The occurrence of the usual *sequelæ* of scarlatina is favoured by several physical causes, to which the patient is liable to be exposed during the process of desquamation and recovery; and it is often prevented by measures calculated to restore the functions of the skin, and to prevent vascular determination to, or congestion of the kidneys, and to diminish these, with the other consecutive or associated causes of obstruction of these organs.

91. XI. TREATMENT.—*The treatment of scarlet fever* has hitherto been unsatisfactory, and in the worst forms of this disease most unsuccessful. This has arisen chiefly from our imperfect knowledge of the successive pathological changes produced by the scarlatinal poison, and from the varied character of these changes with the dose of the poison, with the constitution and circumstances of the recipient, with the season and weather, and with the prevailing epidemic constitution. It must be obvious that, if the earlier changes produced by the infecting or poisonous agent be either misunderstood or not recognised, the consecutive alterations will be very imperfectly, if not most injuriously combated; and that our means of cure will be either inappropriately selected, or misdirected. When treating of *FEVERS*, I have insisted in several places upon the importance of promoting the secreting and excreting functions in all our attempts to *preserve from*, as well as to *cure*, these maladies; for it is chiefly by such measures as promote the depurating action of the emunctories on the blood, through the medium of the organic nervous system, as shown in several parts of this work, that these great ends of practical medicine can be attained.

92. i. PRESERVATIVE TREATMENT.—The fatality of the more malignant types of this malady induced physicians to recommend means for the protection of those exposed to infection; and these means were more frequently advised, and more generally adopted in former times than at present.

The uncertain efficacy, or frequent failure of these means, and the hopes of escaping the more dangerous forms of the malady, probably induced a want of confidence in them, of which they are not altogether deserving, especially in some circumstances in which the disease presents itself.

93. Dr. WITHERING remarks, that during the prevalence of the malignant form of the disease in 1778, when every one was alarmed for himself or his connections, means of prevention were anxiously inquired after. “Some smoked, some chewed, and others snuffed tobacco: some daubed their hands and faces with *thieves’ vinegar*; many more camphor at the pit of the stomach; and still more swallowed bark and port wine. But those who were much conversant with the disease had too ample occasion to observe that none of these methods were effectual.” But Dr. WITHERING had his own notions of prevention based upon a supposition as to the mode in which the poison invades the frame. He believed that the scarlatinal poison “first makes its lodgement upon the mucus separated by the pituitary membrane lining the nose and fauces;” and that those who are exposed to the infection should frequently spit out the mucus that collects in the fauces and promote the discharge from the nostrils. He further advised those who already had imbibed the poison, and had experienced the premonitory symptoms, “immediately to take an emetic; frequently to wash their fauces with soap-leys diluted with water, and to snuff something up the nose that will make them sneeze.” After the operation of the emetic he directed the patient to go to bed, and drink plentifully of wine whey with spirits of hartshorn. He states that a large experience enables him confidently to assert that, if these precautions be attended to, the infection will be either altogether prevented, or else very trifling in its consequences.

94. In the latest edition of Dr. WITHERING’S treatise, and after an extensive experience, he adds, that the progress of infection may be stopped by precautions which may be adopted in almost every house. He had observed that, when boarding-schools were infected and the children were sent home, the disease was more widely spread; and that he therefore adopted the suggestion of Dr. HAYGARTH, and had for several years past never thought it necessary either to break up a school or to disperse a private family. “Allotting apartments on separate floors to the sick and the healthy; choosing for nurses the older parts of the family, or those who had already had the disease, and prohibiting any near communications between the sick or their attendants and the healthy, with positive orders instantly to plunge into water all the linen, &c. used in the sick chambers, have universally been found sufficient to check the further progress of infection.” These recommendations are deserving of adoption, and confirm the opinion which I have stated above (§ 79.).

95. Dr. SIMS remarks, that the best preventive of the disease was found by him to be rhubarb taken in the morning in such quantity as should produce one loose motion in the day. He did not see one who used this confined afterwards to bed, though several persons began it after they were infected, but before the time of their sickening. Dr. R. WILLIAMS considers Dr. SIMS’ authority to be quite as veritable as that of HAHNEMANN, and

his charm even more valuable than that of the latter. Probably any single *prophylactic*, of whatever kind, owes much of the influence it may exert to the confidence reposed in it by the person who has recourse to it. As fear favours, so does confidence resist infection; and when the object of confidence is such as promotes the several assimilating, excreting, and depurating functions, without lowering vital resistance, it combines the virtue of a *charm*—of a mental agent, with its physical operation. The hypothesis of HAHNEMANN is, that diseases are best combated by remedies which produce morbid actions similar to those constituting the diseases themselves; and consequently, as belladonna is capable of producing an efflorescence similar to scarlatina, that it is a preservative against this disease. He asserts that one-eightieth part of a grain of belladonna given twice a day will preserve a susceptible person from an attack of scarlatina;—or that three grains of the extract dissolved in an ounce of distilled water, and three drops of the solution given twice daily to a child under twelve months old, and one drop more for every year above that age, will be sufficient for this purpose. It is possible that belladonna, by its irritant and alterant effects (see art. POISONS, § 537. *et seq.*), may render the system insusceptible of the scarlatinal infection, independently of the principle or law for which HAHNEMANN has contended, empirically and absurdly and in defiance of both reason and argument. It may possess this particular virtue, by producing its specific effects, without furnishing any support to the irrational doctrine, the monstrous absurdity, and the most nefarious practice, which he has originated and promulgated—a practice which knaves alone can adopt, and to which fools only will submit. It is obvious that belladonna can exert no protective influence until it produces, by the continuance of its use, or by its dose, its specific effects, and hence that, even admitting its efficacy, in virtue of these effects, it must frequently fail when it is not given in due season. As to its efficacy, opinions, even in Germany, are much divided; some, with ETTMULLER, SPEUN, BERNDT, KOREFF, HUFELAND, &c. confiding in it; others, with SALZER, and several beside, stating that they have found it inefficacious; whilst many agree with HILDENBRAND in treating it with ridicule.

96. Calomel was recommended by KREYSIG and SELIG as a prophylactic, and as tending to lessen the severity of the attack, when it failed of averting it altogether. THEUSSINK advised the calomel to be conjoined with the golden sulphuret of antimony. EICHEL believed in the efficacy of emetics, as advised by WITHERING, especially when they are followed by diaphoretics. Several writers have recommended the mineral acids. I have reason to believe that the nitro-hydrochloric acids are not devoid of efficacy as a prophylactic; and that capsicum may be placed in the same category, especially when conjoined with small doses of camphor and quinine. The most certain prophylaxis is, however, to be found in the adoption of those measures which I have fully detailed in the article INFECTION (§§ 55. *et seq.*), when treating of its prevention and counteraction, and in that on PESTILENCE, PROTECTION FROM.

97. ii. CURATIVE TREATMENT.—It is obvious from what has been advanced, that the treatment of scarlet fever should be directed with strict

reference—1st. to the type and form of the disease,—2d. to the character of the prevailing or stationary epidemic constitution, as insisted on above (§ 10.);—and 3d. to the pathological conditions, primary and secondary, to which I have endeavoured to direct special attention. With these objects in view, I shall *first* describe the means which are most appropriate in the different forms of the malady; and *next* remark upon the several remedies which have been recommended by the best authorities, and the circumstances in which they may be most beneficially resorted to. Without failing to give these authorities their due weight, I shall be guided chiefly by the results of my own observation and experience.

98. *A. Simple Scarlatina*—*S. Mitis*—*S. Simplex*.—Mild or simple scarlet fever (§ 18.) may require but little treatment beyond attention to ventilation and diet, and to the several excreting functions, especially if the febrile symptoms be slight. If, however, the pulse is quick, sharp, or rapid, or the skin hot, the quantity, appearance, and character of the urine should be carefully examined, and if this excretion be scanty, and the fever considerable, although the disease may appear simple and regular, yet it may assume, even in the course of a few hours, a much more severe form. If there be vomiting at the commencement; and more especially if the retchings be attended by pain in the loins or limbs, and scanty or suppressed urine, an emetic should be exhibited, and its operation be promoted by demulcent diluents, and warm diaphoretics; and the functions of the skin be promoted by the tepid bath. The action of the emetic tends both to remove the congestion of the kidneys either already existing or apt to supervene in these cases, and to determine to the surface of the body. If the patient be strong or plethoric, and if the prevailing epidemic constitution do not contra-indicate this measure, a small or moderate cupping over the loins; and, in different circumstances dry-cupping in this situation, may be practised if the symptoms are not mitigated by these means. The bowels should be evacuated by suitable aperients—by one or two doses of calomel and antimony, followed by saline aperients, as the phosphate of soda, &c. taking due care merely to promote and to evacuate the secretions and excretions without causing unnecessary irritation.

99. The chief *intentions* directing our practice, in the milder cases of the disease, are,—1st. to prevent the increase of febrile action,—2d. to promote the excreting and depurating functions,—3d. to remove local congestions and determinations, whenever and wherever they occur; and 4th. to preserve or to restore the functions of the skin and kidneys after the subsidence of the eruption, and during the process of desquamation. If we fail in the complete fulfilment of these intentions, the indications and means about to be described should be adopted, appropriately to the phases through which the disease may pass, and to the complications which may supervene. Although the mild and regular form of the disease generally proceeds favourably, yet, owing to many disturbing causes, and not infrequently in consequence of the nimia diligentia medici, it may assume a serious or complicated form, more especially when vital power is suddenly reduced, when

excreting functions are interrupted, or when local determinations are favoured or occasioned.

100. *B. Scarlatina anginosa* — *S. inflammatoria*. — The more inflammatory types or states scarlet fever (§ 19.) generally require prompt and active measures. But it ought not to be overlooked, that the terms here employed to designate the more *sthenic forms* of the malady are altogether arbitrary — that many mild, as well as all the malignant states of the disease are anginous; and that, whether simple, regular, mild, anginous, or malignant, it may also be inflammatory; the great and essential difference being the degree in which *sthenic* or *asthenic* action is present — in the amount of organic nervous or vital power, and in the state of the circulating fluids. This type or form of the disease requires a modified, or even very different, treatment according to the phases it may assume, and the grades of vascular action and vital power, as different or individual cases pass through the various phases from the mild to the inflammatory, or from the simple and regular to the complicated or malignant (§ 20.).

101. (a.) In the more *sthenic diathesis*, or *inflammatory* type, of this fever, an *emetic* of ipecacuanha, or of ipecacuanha and antimony, is generally of service, especially at an early period; and its operation should be promoted by warm diluents. It is not the less beneficial when vomitings are already complained of, and the urine is scanty, and pains in the loins are present. In these latter circumstances, especially when the pulse is full or strong, the abstraction of blood from the loins by *cupping*, the quantity taken being such as the age, habit of body, and peculiarities of the patient will warrant, is generally beneficial; but *bleeding* from a vein is seldom of service — more generally prejudicial, unless in the more *sthenic diathesis* and robust constitutions. If generally adopted, bloodletting is a destructive practice, unless in rare epidemic visitations, when the prevailing epidemic constitution admits of the practice, with such limitations and cautions as the nature of the disease and the peculiarities of the case suggest. During the stationary epidemic constitution from about 1810 to 1820 or 1825, bloodletting, even in this disease, especially in its more inflammatory types, was much better tolerated than subsequently; and some writers considered their recommendations of it as sufficient to constitute it the chief remedy, in all circumstances, and for all time; denouncing those who had preceded them for advising different means, although more appropriate for the types of the disease for which these means were employed. More recently, and since late writers have ascertained that bloodletting should be most cautiously employed, even in the most inflammatory type, cupping on the nape of the neck, or the application of leeches behind the ears, has been advised for the more *sthenic anginous form* of the malady, and often practised by myself for many years. But, when pain in the loins and limbs, and scanty, high-coloured, or otherwise morbid urine, or suppression of urine, are present, I then have preferred the abstraction of blood by cupping over the regions of the kidneys, to an amount dictated by the peculiarities of the case, and have prescribed the following *embrocation*, to be applied by means of flannel or spongio-piline around the neck and throat; or either of the *liniments* in the APPENDIX

(see FORM. 295, 296, 307, 311.) to be thus employed. If either of these applications produce external inflammation or discharge from the surface, the consequences are never troublesome, as sometimes observed when blisters are used.

No. 335. R. Linimenti Terebinthinæ, ʒij; Linimenti Camphoræ Comp. ʒj; Olei Olivæ, ʒiij; Olei Cajuputi, ʒj. m. Fiat Embrocatio more dicto utenda.

102. When the emetic action has subsided, the bowels should be gently or moderately evacuated by means of *calomel*, either alone, or with rhubarb or jalap, or with the addition of magnesia or the dried sub-carbonate of soda; and followed by manna, salts, &c., in the infusion of roses or of senna; or by castor or olive oil, according to circumstances; or by equal parts of the compound infusions of gentian and senna, with the carbonates of soda and ammonia.

103. The great heat of skin in this state of the disease suggested a recourse to the *affusion of cold water* on the surface, as too strenuously and indiscriminately advised by Dr. CURRIE. When I commenced practice I adopted this treatment in scarlet fever, and extended it to several other diseases, and certainly with more benefit in them than in this. For, in the more *sthenic forms*, it was soon followed by an equal, or even by an increased heat of the surface, and in the more *asthenic conditions*, it appeared to favour the development of internal complications: in most of the forms of the malady, it contingently favoured congestion of, or determination of blood to, the kidneys, and thereby aggravated the disease. I therefore relinquished the practice, and substituted the *tepid bath*, or the *cold or tepid sponging* of the surface, using simple or medicated fluids for this purpose, according to existing states of the fever; and preferring of the latter, such as were emollient and alkaline.

104. After moderate evacuations from the bowels, saline mixtures or draughts, of a *diaphoretic* and *diuretic kind*, in a state of effervescence, will always be agreeable, and tend to moderate the febrile action, as the acetate or citrate of potass, with the acid in excess, in the more *sthenic cases*; or the acetate or citrate of ammonia, with the ammonia in excess, in the more *asthenic*; and with the spirits of nitric æther with either, will be generally appropriate. In this form of the disease, *gargles* have been very generally recommended, and are sometimes of service when their composition is such as suit the state of the case. Those which are cooling, or which contain the nitrate of potass, or the hydrochloride of ammonia, are the most grateful and beneficial. Children can use them only as washes for the mouth; but they are useful as such; and they may be injected into the mouth and throat of younger children; or a clean sponge, attached to a piece of whalebone, may be moistened with them, and be employed to cleanse the mouth and throat from time to time. The infusion of roses, or of cinchona, or decoction of cinchona, or red wine and water, or camphor or rose water, may be employed as the vehicle for these salts, or for the other substances which may be used in this manner. (See FORM. 158—167, in the APPENDIX.)

105. A prompt recourse to the means now advised will generally prevent the occurrence of the *complications* (§§ 27. et seq.) often met with in this form of the disease, more especially if these

means secure a free excretion of urine. But if any local determination or complication arise, notwithstanding; or if it have taken place before the treatment was commenced, the agents used for combating it should have strict reference to the existing state of vital power. *Local depletion* will often be of service when power is not much reduced; but we must not expect that the complication, however inflammatory it may seem, is to be removed by depletions only or even chiefly. The pathological source of these complications, as already explained (§§ 28. *et seq.*), will show the futility of the expectation. Whilst the local depletion may tend to reduce the vascular fulness, local and general, means should be employed to rouse the action of the kidneys, to determine to the cutaneous surface, and to promote the secretions and other depurating functions. In the circumstances now being considered, there are no means more efficacious, especially in restoring the functions of the skin and kidneys, and in deriving from the seat of local affection, than flannel cloths coming out of hot water, freely sprinkled with the spirit of turpentine, or with the embrocation just prescribed (§ 101.), and applied either over the epigastric and abdominal regions, or over the loins. This *epithem* should be covered with oiled silk, or with a warm napkin, so as to confine the fumes from it as much as possible to the surface of the body. In most of the complications of this form of the disease, the bowels should be preserved in a moderately open state, by the means already mentioned (§ 102.), or by castor or olive oil; and their action may be promoted by the occasional administration of an *enema*, containing either or both these oils, with spirit of turpentine. The cooling diaphoretics and saline medicines advised above (§ 104.) may also be given from time to time in a state of effervescence, or otherwise. If the bowels be irritated or too much relaxed, the liquor ammoniæ acetatis may be given with the ammonia in excess, and with the tinctura camphoræ composita, or the syrupus papaveris; and the epithem or embrocation already prescribed should be assiduously applied over the abdomen.

106. (b.) When the anginous or inflammatory form of scarlatina assumes more of the *asthenic* diathesis or type, and according as it approaches the malignant form, the treatment should be modified. In these states even local vascular depletion is either inefficacious or injurious. But *emetics*, especially early in the attack, are generally beneficial. The other means already stated are also of service, more particularly the terebinthinated *epithem* or *embrocation*, and the saline diaphoretics; and, if congestions of internal parts take place in this state of the disease, the epithem or embrocation should be energetically employed. If an aperient be required, a moderate dose of the spirit of turpentine should be added to the oils, advised above (§ 105.), and be administered by the mouth, or as an enema, as the circumstances of the case will suggest. In the less urgent or dangerous cases of this form, and in the complications which may supervene, the internal and external means already recommended will generally be appropriate; but the urinary excretion should always receive attention; and when it becomes scanty or suppressed, an ipecacuanha emetic should be given, and the terebinthinate epithem or embrocation be

applied over the loins, and the spiritus ætheris nitrici and liquor ammoniæ acetatis be prescribed in sufficient quantity. In proportion as the case assumes, either primarily or consecutively, a malignant character, so ought the means about to be advised for the next form of the disease to be employed.

107. C. *Scarlatina maligna*—*Malignant Scarlet Fever* (§§ 20. *et seq.*), is often so sudden in its seizure and so rapid in its progress as to require the most efficient means, with the utmost promptitude; and, if the means be either inefficient or delayed, the extension of the affection of the throat to the adjoining passages, and the super-vention of complications, which vary or differ in different cases, are common results. The severity of the affection of the throat, in these cases, has frequently induced the practitioner to apply leeches to the neck or behind the ears; but they are generally injurious, more especially when the pulse is very rapid and compressible. Even local depletions in this form of the malady are rarely of service; and when leeches are applied to the neck or throat, diffusive inflammation of the cellular tissue, in connection with enlargement of the parotids, &c., either extending from the internal parts, or excited more externally by the leeches, is not an infrequent result. Whatever may be the state of the urine,—however morbid or scanty this excretion may be, as it usually is, in these cases,—an *emetic*, consisting either of ipecacuanha or of sulphate of zinc, or of both, to which a little pulvis capsici may be added, should be given without delay, and its operation be promoted by drinking a warm infusion of chamomile flowers, or of bark,—the latter made weak in proportion to the quantity to be taken,—and the terebinthinate embrocation or epithem ought also to be applied over the loins, in the manner advised above. The throat should also be surrounded by either the embrocation or the epithem. In a very short time, the relief which the patient will experience, especially as respects the state of the throat, will be remarkable; but, to render the relief permanent or progressive, further means should be employed.

108. In this state, the decoction of *cinchona* should be given every three or four hours, with the carbonates of *soda* or *potash*, or *ammonia*, either in a state of effervescence, the alkali being in excess, with acetic or citric acid, or with the carbonate of the alkali only. If the decoction be not taken with the acid, the fixed and volatile alkalies may be given at the same time, with the addition of the spiritus ætheris nitrici and tincture of serpentaria. It is often difficult to determine whether or not the decoction should be combined with an *acid* or with an *alkali*, in the more malignant states of scarlatina. The choice should depend, in some measure, on the state of the urine. If this excretion be not suppressed, and if it be alkaline or contain phosphates, the cinchona should be conjoined with *hydrochloric acid* and *hydrochloric æther*; or the *sulphate of quina* may be given, in the infusion of roses, with dilute *sulphuric acid* and *sulphuric æther*, or the compound spirit of æther. When, however, the urine is suppressed, or nearly so, and when it presents an acid reaction, or is albuminous, or bloody, after having recourse to emetics and terebinthinate epithems over the loins, I have generally preferred

a combination of the decoction of cinchona with the liquor ammoniæ acetatis and the carbonate of ammonia; or with either of the alkalies, in a state of effervescence with a vegetable acid. (See APPENDIX, Form. 385. 388. 416. 437.) More than half a century ago Dr. GARNETT recommended the *chlorate of potash*, with or without the decoction of bark, in malignant scarlatina; and Dr. CLUTTON the *hydrochloric æther*. I have often prescribed them both since 1820, in public and private practice, and with marked benefit, in the malignant or putro-adyynamic states of the disease, appearing either primarily or consecutively. If the symptoms are not ameliorated, an emetic should be again administered, and even repeated, but it should be conjoined with capsicum, or some other stimulant; and the decoction of cinchona, combined as above, should be continued afterwards, with the addition of either the compound tincture of bark, or the tincture of serpentaria or of capsicum, the embrocation or epithem being repeated, and the bowels moderately evacuated by the means already suggested (§§ 102, 105.).

109. In the more putro-adyynamic or malignant states of the disease, *chlorine* and the alkaline *chlorides* have been given with benefit, either alone or conjoined with the means already mentioned; but the external applications advised above, and the evacuation of morbid secretions and excretions by emetics and the aperients already prescribed, should not be neglected. Frequent and considerable doses of powdered *carbon*, or charcoal, have also been given, and on several occasions by myself, conjoined with *quinine*, or powdered *cascarilla* and *cinnamon*, or with the addition of *camphor*, *creosote*, and two or three drops of the tincture of *capsicum*. These, mixed in treacle, have a good effect in correcting the morbid action and secretions in the throat and fauces, especially when aided by the application of the terebinthinate embrocation around the throat. When the throat and fauces are much affected in this form of the disease, as is generally observed, not only should these substances be taken, either in treacle, or in syrup or conserve of roses, or such other vehicle as would form them into a *linctus*, but the *gargles* mentioned above (§ 104.), or those referred to in the APPENDIX, should be employed, in the manner there particularised, in the intervals between the administration of the other means. Gargles, however, are often unavailing, and in children can be employed only as washes in the manner already noticed. In the more severe and malignant affections of the throat and fauces, the application, by means of a brush, or sponge attached to a piece of whalebone, of a strong solution of *nitrate of silver* (ʒj. or ʒss. to an ounce of water), or of *alum* in *acetic acid*, will be much more efficacious, especially when early adopted. In this very malignant state of the disease, it may be necessary not to rest satisfied with *quinine*, or preparations of cinchona or serpentaria, capsicum, camphor, ammonia, chlorine, &c., as severally above prescribed, but also to give *wine*, or even *brandy*, with various farinaceous or dietetic substances, as sago, arrow-root, yolk of eggs, &c., or with certain beverages, as Seltzer water, soda-water, or ginger-beer, or spruce-beer.

110. *D. Scarlatina sine Exanthemate*.—Scarlet

Fever without eruption should be treated with strict reference to the character of the attendant fever and to the state of the throat. Some of these cases present more or less of an inflammatory diathesis, whilst others are remarkably asthenic, or are attended by extreme depression of vital power. According as these different states occur, so should the treatment be directed, conformably with what has already been advanced. When vascular depletion is indicated in this form, the evidence which I have observed of congestion of the kidneys and the state of the urine have induced me to direct *cupping* on the loins, followed by the terebinthinate *epithem* or *embrocation*, in that situation; and around the neck and throat, if the fauces are much affected. I have already contended, that the primary affection of the kidneys, in this form of the malady, very often prevents the development of the cutaneous eruption, and that the consequent imperfect depuration of the blood by these organs causes various internal complications. The removal of this congestion or affection of the kidneys should therefore be a primary intention of cure; and when the state of constitutional power does not admit of vascular depletion, as now advised, it should be attempted by the exhibition of *emetics*, by *dry-cupping* on the loins, and by the terebinthinate application already mentioned. *Purgatives*, especially those already mentioned, administered by the mouth or in enemata, and the other means specified above, according to the character of the fever and state of vital power, are generally also required. In this form, various complications are apt to appear, either at an early or at an advanced stage, generally owing to the pathological cause already assigned. The head, the lungs, the pleura, or the digestive mucous surface, &c., or even two or more of these, may manifest the most serious and even the most rapidly disorganizing change, and require the most efficient and prompt measures. If the morbid action approach, and according as it possesses, a sthenic character, local vascular depletions are necessary; but no dependence should be placed on those alone. The functions of the kidneys should be strictly examined, and the treatment be directed to them. Cupping or dry-cupping, followed by the terebinthinate applications, in that quarter, emetics, saline diaphoretics conjoined with diuretics, warm medicated baths, especially warm baths containing salt or carbonates of the alkalies, with mustard, are amongst the chief means of cure in these and similar cases. When vital power appears extremely depressed, or exhausted, the tonic and restorative remedies advised above (§§ 108, 109.) must be prescribed in order to resist the tendency in these circumstances to contamination of the circulating fluids and to fatal sinking.

111. *Blisters* have been recommended by many as derivatives, especially when internal complications occur in this form of the malady; and, in adult subjects, they are often of service, although not so immediately and generally beneficial as terebinthinate epithems and embrocations, when these latter are judiciously employed. In children, blisters, even when cautiously managed, are often dangerous applications in scarlatina. Mustard poultices are preferable, but are much inferior in efficacy to the terebinthinate embrocation.

112. When the affection of the *throat* is very malignant or threatens to extend to the adjoining passages, especially if it advances to the *larynx*, then emetics, especially such as have been advised above (§ 107.), should be administered, and the constitutional powers fortified by tonics so as to resist the extension of the local mischief; and the throat and neck should be surrounded by a terebinthinate epithem or embrocation. Blisters in these cases are generally more injurious than beneficial; and the same may be said of *mustard poultices*, when applied to the throat. Emetics consisting chiefly of mustard have been given in these cases, but they often irritate the throat too much during deglutition, and are not so immediate or certain as the sulphate of zinc or ipecacuanha, or as a combination of these. When an ichorous or excoriating discharge proceeds from the throat, fauces, &c., or when these parts indicate or manifest a sphacelating state of ulceration, then the application of *pyroligneous acetic acid* with *creasote*, or the strong solution of *nitrate of silver*, prescribed above (§ 109.), by means of a sponge, to the affected surface, or the use of *gargles* containing these substances, with the addition of the tinctures of *myrrh* and *krameria*, and the administration of *tonics* and *restoratives* internally, are chiefly to be confided in.

113. *E. Scarlatina Latens* — *Latent, suppressed, or masked Scarlet fever*, in which neither eruption nor sore-throat appears, is comparatively rare, but it is a most serious, and often a fatal form of the disease when it occurs (§ 26.). It would seem, as above stated, that the scarlatinal poison or infection primarily affects the kidneys, in this form, or both the kidneys and serous membranes, primarily and chiefly; the affection of these parts preventing the development of the disease in the throat and skin, and rapidly increasing the contamination of the blood, and the effusion into serous cavities. In these cases, the disease has proceeded to effusion either into the cellular tissue, or into a serous cavity, before medical care is required. In all the instances which I have seen, the urine was either suppressed or very scanty, albuminous and sometimes bloody, from the earliest period of the recognition of the nature of the affection: and there were, moreover, febrile symptoms, with sickness and vomitings, and pain in the loins and limbs, for at least one, or two, or even more days, before any indications of œdema or internal local affection had appeared. When, therefore, these phenomena are observed in susceptible persons, in the same family, house, or locality in which scarlet fever prevails, then should energetic measures be instituted to remove the active vascular congestion manifestly existing in the kidneys, and not infrequently also in other parts, and rapidly inducing further and most irremediable changes. But these measures should, as in other circumstances of the malady, have strict reference to the existing states of vascular action, in connection with constitutional power or resistance. *Cupping* over the loins, or even a repetition of it, and immediately or soon afterwards procuring full vomiting by *emetics*, are the means which should be first and promptly employed. When blood cannot be further abstracted without risk, then *dry-cupping* may be substituted; and terebinthinate *epithems* or embrocations should be applied over the loins, or over the region of the

prominently affected organ or part, and repeated or persevered in, according to the effect produced on the system and on the local affection, and more especially on the functions of the kidneys. In some cases it will be most advisable to cause the patient to be placed in a *tepid* or *warm bath* after the cupping and operation of the emetic; and the effect of the bath may be increased by adding either the carbonate of potash or the carbonate of soda, or common salt, and the flower of mustard to the water, so as to determine to the surface of the body, and procure a free cutaneous exhalation. This intention will be promoted by applying, immediately after the patient is removed into bed, the terebinthinate epithem or embrocation, as just advised, and by prescribing *saline diaphoretics* and *diuretics*, especially such as contain the liquor ammoniæ acetatis and spiritus ætheris nitrici. The state of the bowels also requires attention. A full dose of *calomel*, either alone or with an *antimonial*, should be given after the operation of the emetic, and even repeated after a few hours; and some hours afterwards, either of the *purgatives* mentioned above (§ 102.) ought to be administered, and be followed by the terebinthinate *enema*, if the evacuations be not sufficiently free; or if a purgative be subsequently required, without interfering with the exhibition of the diaphoretics and diuretics indicated by the state of the case. As this form of the malady is usually more or less complicated (§ 26.), the means about to be further suggested in respect of the complications of scarlatina, are equally applicable to it as to the other forms of the malady.

114. *F. The complications of scarlatina* are often the chief causes of danger, and hence require the most active and best devised means. The remedies which most of those complications require, have been in great measure anticipated by my remarks on the curative treatment of the several forms of the malady, for it is inconsistent with the due consideration of the subject to separate the complicated, and hence the most severe states of these forms from those states or phases into which they insensibly pass. There remain, however, a few prominent topics, or pathological conditions of importance, which occasionally present themselves as dangerous emergencies, and which require a more especial notice.—(a.) I have already insisted sufficiently on the prominent *affection of the kidneys* (§ 28.), which may be detected at an early stage of many of the more severe and complicated cases of scarlatina, and have fully stated the means which I believe to be most efficacious in removing it, viz. cupping, or dry-cupping, or both, on the loins, followed by emetics, terebinthinate applications, the tepid or warm bath, simple or medicated, diaphoretics and diuretics, &c.

115. (b.) The extension of an asthenic or *diffusive form of inflammation* from the throat and pharynx to the *larynx*, or along the *Eustachian tube* to the ear (§§ 30—32.), is to be prevented chiefly by emetics; by the application of terebinthinate epithems around the throat; by tonics or restoratives, in order to increase the vital resistance to the spread of the local mischief; and by antiseptic and astringent gargles, washes or similar applications tending to correct or arrest the local morbid action (§§ 104, 109.). *Hæmorrhage* from the nose, throat, or ears, requires consideration. If it take place from the nose—*epistaxis*—and especially if

the patient be subject to this occurrence, it may prove critical, especially in the more inflammatory or sthenic cases, and should not be prematurely interfered with. But, an intercurrent epistaxis, even in these cases, if too profuse, but still more readily in the malignant or asthenic, may so reduce vital power, as shown above (§ 33.) as rapidly to sink the patient. Therefore, in this latter state of the disease, and especially when the blood proceeds from the mouth, throat, or ears, the hæmorrhage should be arrested, if possible, as soon as may be, by the astringent gargles or washes for the mouth already mentioned (§§ 104, 109.), especially those containing the pyroligneous acetic acid and creasote. The difficulty of arresting the bleeding is always the greatest in the most malignant cases, owing to the state of both the blood-vessels and the blood circulating in them. In these cases the attempt to arrest it should be made early; and if the means already indicated, aided by tonics and astringents taken early, should fail, the administration of the spirits of turpentine internally, either in considerable or frequently repeated doses, ought not to be delayed; for this is one of the most energetic anti-hæmorrhagic medicines which can be prescribed—if, indeed, it be not the one chiefly to be relied upon in these and similar cases.

116. (c.) *When diffusive inflammation of the cellular tissue of the neck or throat occurs* (§ 34.), then the most active tonic and stimulant remedies are required, in connection with antiseptics, both internally and externally. The selection of these should be made, as already advised (§ 108.), with reference to the state of the excretions, and more particularly of the urine, the same indications guiding the choice as have been there mentioned. The means which have been already advised for the most malignant form of this malady (§§ 107. *et seq.*), and for *diffusive inflammation of the cellular tissue* (see CELLULAR TISSUE, §§ 34. *et seq.*), are also appropriate in this complication.

117. (d.) *Gastro-enteric disorder with diarrhœa* (§ 35.), is a frequent occurrence, and requires an early recourse to astringents, antacids and aromatics, especially when it is consequent upon malignant affection of the throat, and is attended by suppression of the eruption. In these circumstances coma soon supervenes from exhaustion, if vital power be not duly supported by suitable tonics and stimulants. The warm bath, containing salt and mustard; terebinthinate embrocations over the abdomen after coming out of the bath; the infusion of cascarrilla or of cinchona, or the decoction of the latter, with lime water, or with ammonia, camphor, compound tincture of camphor, capsicum, or other aromatics, or aromatic confections; wine or brandy, with spices, in farinaceous preparations, as advised above (§ 109.); or the means which are recommended in the enteric complications occurring in continued fevers (see FEVERS §§ 549. *et seq.*) and in MEASLES (§§ 75. *et seq.*), are severally beneficial. I have recently prescribed *salicine* in this complication with great advantage, in doses varying with the age and severity of the bowel affection, and in conjunction with the substances just mentioned in the more obstinate cases. The bark of the willow may be given in decoction, infusion or powder (from 5 grains to ʒij); or the *salicine* in doses of one grain to five or six.

118. (e.) *Convulsions, coma, &c.* (§ 36.), are most unfavourable complications, although not necessarily fatal. The former occur chiefly in young children, sometimes on the accession of the disease; the latter in both children and adults. They are both, even when occurring early, often consequences of obstruction of the urinary excretion, although the cause is generally overlooked. When these affections appear early, and manifestly from this circumstance, cupping over the loins, or the application of a few leeches in this situation in young children, the warm or tepid bath, terebinthinate embrocations on the back, and active purgatives are generally required. When the symptoms in other respects display no putro-*adynamia*, and when the pulse retains some strength as well as fulness, then vascular depletion is more beneficial than in some states, in which it is more commonly resorted to. Calomel with antimony, or jalap, and followed by other purgatives, especially by castor oil and spirit of turpentine, and by terebinthinate enemata, are generally necessary. When coma is obstinate, then a full dose of spirit of turpentine, according to the age of the patient, with assafoetida and camphor, should be administered as an enema; and, as soon as the bowels are freely evacuated, saline diaphoretics, and diuretics may be given. In some severe cases of this complication, I have directed the head to be surrounded, and the vertex to be covered, by flannel moistened with turpentine, or with the terebinthinate embrocation prescribed above (§ 101.). During the treatment the state of the urinary function should be carefully ascertained, and if it be suppressed or scanty, endeavours should be made to restore it, and at the same time to excite other emunctories or depurating organs to increased action, especially the skin and bowels. The existence of coma or convulsions should not prevent the administration of emetics, when the measures just advised have failed; for the emetic action both rouses the action of the kidneys and determines to the surface of the body, whilst it procures a discharge of fluid from the digestive mucous surface, thereby relieving the vascular system from a portion of the serous fluid over-distending it, and congesting the vessels of the brain.

119. (f.) The appearance of either of the *affections of the lungs, bronchi or pleura* (§§ 37, 38.), or even of the *peritoneum* (§ 39.), which often complicate the severer cases of scarlatina, especially the forms unattended by eruption, requires both judicious and prompt measures. If either occur during the eruptive stage, and more particularly if it be followed by the sudden disappearance of the eruption, local bloodletting is generally necessary; but the quantity of blood which may be taken, and the propriety of taking any, as in all other circumstances, should depend upon the state of the pulse, upon the existence of deficient vital power, or of putro-*adynamia*, and upon the state of the urinary function. Cupping, or the application of leeches, followed by dry-cupping, and the terebinthinate embrocation or epithems, assiduously or repeatedly applied, are the principal means of cure. But we should not confide too much in vascular depletion even in these complications, especially in some epidemics, and in certain localities which depress vital power and render the disease either malignant

or complicated (§ 85.). The external applications just mentioned are often more beneficial than any other means, especially when aided by appropriate internal remedies, as the liquor ammoniæ acetatis, spiritus ætheris nitrici, and moderate doses of camphor. It sometimes becomes a question as to the situation, in which local depletion, and external applications should be employed. If in these complications, as not infrequently observed, the urine is either suppressed or very scanty, or bloody, or albuminous, the local affections being the consequences of obstructed elimination and depuration by the kidneys, the loins are the situations in which these means should be applied, especially in the first instance; but otherwise over or near the chief seat of local complication. In other respects the treatment may be the same as just advised for coma or convulsions (§ 118.).

120. *G. The sequelæ of scarlatina* are sometimes more dangerous than the primary disease. The consecutive affection is generally caused by errors in diet or regimen during the process of desquamation, and during recovery; and the treatment should, therefore, be directed with reference to these causes. During early convalescence the digestive functions are weak, and the primary processes of assimilation are imperfectly performed, unless the nature and quantity of the aliment be such as will be readily and perfectly disposed of. As the appetite during convalescence is greater than the power of digestion, food is often taken of a kind and quantity furnishing a chyle unsuited, owing to imperfect digestion, to the state of the blood, and which, in conjunction with the large proportion of effete materials, absorbed from the various tissues and surfaces, and carried into the blood during the advanced stages of the disease and during convalescence, renders the blood either too irritating or otherwise injurious to the excreting structure of the kidneys; and this effect upon these organs is heightened by the interruption to the eliminating or depurating function of the skin during early convalescence, the kidneys thus sustaining, during this period, the whole burthen of depurating function, at a period, moreover, when the blood most remarkably and unusually abounds in hurtful and irritating materials, derived from imperfect assimilation, and from the absorption and accumulation of effete molecules and structural elements derived from the several tissues,—these elements or materials constituting the urea, uric acid, animal extractive matters, &c., forming the products of a destructive assimilation, or the ultimate products of animalization. It must be further manifest that if the blood, thus loaded with effete or irritating materials, be determined in unusually increased quantity to the kidneys by exposure to cold, by damp clothes, or insufficient clothing or other causes, even by great humidity of the air, these organs will sustain, as respects their minute excreting structure, more or less irritation or other injury, interfering with or interrupting their eliminating function, the blood thereby becoming still more impure and consisting of an increased proportion of watery and extractive constituents, as already more fully contended for (§§ 28. *et seq.*). These causes and their effects upon the frame—the primary effects now shown, and the secondary effects, constituting the several sequelæ of the malady,—being manifestly and certainly those just stated, it follows, that the

means most appropriate to the removal of the secondary effects or sequelæ, are such as will most efficiently remove the causes and primary changes which produce the secondary effects or sequelæ, whatever these latter may be.

121. Conformably with these pathological principles, the treatment should be directed—1st. To the state of the kidneys, as indicated by the condition of the urinary function and excretion, and by other signs or symptoms;—2nd. To the causes, extrinsic and intrinsic, remote or pathological, of the state of these organs;—and 3rd. To the secondary affection, or sequelæ, resulting generally either from the persistence of some lesion which originated during the course of the malady, or from the affection of the kidneys caused as just shown (§ 120.).

122. (a.) *The prevention of the affection of the kidneys*, upon which the most frequent of the secondary diseases or sequelæ of scarlet fever chiefly depend, should be a principal object in the treatment of this malady. During desquamation and early or advanced convalescence—for a month at least after the disappearance of the eruption—the patient's diet and regimen should be strictly prescribed, however mild the disease may have been. The food should be bland, light, and digestible, chiefly farinaceous, so that as little as possible of the irritating materials to the kidneys should accumulate in the blood. The beverages of the patient ought also to be of a bland or demulcent kind, and consist chiefly of soft or distilled water, wine and malt liquors being avoided. Exposures to cold, currents of air, to humid and cold states of the atmosphere should be carefully prevented, and the clothing ought to be warm. The due restoration of the functions of the skin should be attempted early in the stage of desquamation by recourse to tepid or warm baths, in which a quantity of the sub-carbonate of soda or potash, or biborate of soda is dissolved; and the secretions and excretions duly promoted by purgatives or aperients, and by diaphoretics. By attention to these, the sequelæ of scarlatina proceeding from obstruction of the kidneys will rarely be observed.

123. (b.) If, notwithstanding these precautions, or owing to the neglect of them, the state of the urinary excretion or other symptoms indicate congestion or obstruction of the kidneys (§ 49.), the treatment should be directed chiefly to these organs. Unless the constitutional powers have been, or still are, extremely depressed, the antiphlogistic regimen, medicinal and dietetic, ought to be adopted. As this affection is so often the result of over-feeding during convalescence, or of a too early recourse to animal food and exciting beverages, these causes should receive due attention; and if the mischief can be referred to them, not only ought they to be prevented, but the removal of the disorder should be attempted chiefly by means of local depletion from the loins, of purgatives and diaphoretics, by the tepid and warm bath, and by terebinthinate epithems or embrocations applied over the regions of the kidneys. The vascular depletion may even be repeated, for it is not unusual to find the sequelæ of scarlatina to require, and the patients affected by them to tolerate, the bleeding more than in any of the previous stages of the malady.

124. (c.) When *anasarca* or *effusion* into any

serous cavity, or from any serous surface (§§ 50—55.), is consequent upon this disease, in the manner now shown, the effusion, in whatever situation it may occur—between the membranes, or in the cavities of the brain, in the pleura or pericardium, in the peritoneum, or in the capsules of the joints,—is the consequence of active determination of blood to, or of irritation of, these membranes, caused by vascular excrementitious plethora, as above contended for (§§ 28. 120.); and if it should occur independently of these states of vascular action, it may be admitted as a very likely means to excite these states, owing to the morbid or irritating properties possessed by it, especially when it is retained long in any of the cavities formed by these membranes; so that upon post mortem examination it may be difficult to determine, whether or no such inflammatory appearances as are found are actually the cause or the effect of the effusion: it is not improbable that they are in some measure both the one and the other. But it is not merely effusion into shut cavities which may follow upon obstruction of the urinary and cutaneous excretions after scarlatina, but a form of *congestive inflammation* of parenchymatous organs (§ 57.), characterised by more or less *œdema* or serous infiltration of the affected organ, may supervene, or this latter affection may be associated with serous effusion into the adjoining serous cavity—an association which is frequent, and although the extent of the internal lesion may escape detection during life, or the one part of the mischief may mask the other, examination after death discloses the combination. I have on several occasions found, on inspection of cases of this description, the lungs condensed more or less by the infiltration of a watery lymph, and serous effusion in both pleural cavities; and in other cases the substance of the brain vascular, watery, or oedematous, although there existed also serous effusion into the ventricles and between the membranes. These are amongst the chief lesions which destroy life after attacks of scarlatina, and are merely the remote effects of the arrest of the eliminating or depurating functions, to which I imputed so great importance many years since, in the articles on the BLOOD, DISEASE, FEVER, &c.

125. It is obvious that the *treatment* of these affections ought not to be directed to them only or chiefly, but to the pathological causes or states of which they are the effects—to the obstructions of the kidneys and skin. However much bloodletting may be indicated by the state of the pulse and other circumstances of the case, a chief dependence ought not to be placed on it, even when apparently most required, but other active agents should be brought into operation, more especially purgatives, the tepid or warm bath, medicated as above (§ 122.), terebinthinate epithems or embrocations over the loins or seat of local affection, after local depletions in either or both situations, and diaphoretics, followed by diuretics. These means are appropriate in the several sequelæ of scarlatina, the chief differences as respects either sequelæ being the extent to which each of them may be employed, and the succession in which they may be prescribed so as to obtain the greatest amount of benefit. After vascular depletions have been carried sufficiently far, dry-cupping will then be of service; and after terebinthinate epithems have been applied, oleaginous purgatives and

enemata may be administered, containing spirit of turpentine in sufficient quantity to excite the organic functions, to restrain effusion, and to stimulate the kidneys. In most respects the treatment of the sequelæ of scarlatina is the same as that of the complications (§§ 114. *et seq.*); and it should be based on the same pathological and therapeutical principles.

126. (*d.*) I have noticed amongst the sequelæ of this malady, the *extension of disease to the ear*, to the *cervical vertebrae*, &c., to the *parotid glands*, the *surrounding cellular tissue* and *lymphatic glands*, &c. (§§ 46—48.), giving rise to more or less chronic disease of these parts; but it is unnecessary to add, at this place, any thing to what has been stated respecting these lesions in the articles CELLULAR TISSUE (§§ 34. *et seq.*), EAR (§§ 29, 30.), PARALYSIS (§§ 129. *et seq.*), PAROTIDS (15. *et seq.*), and SPINE. It has also been remarked that affections of the large, but more frequently of the small *joints* (§ 57.), or even of both, may occur at any period after the subsidence of the eruption; and that *erysipelas*, or even *gangrene* of an extremity may thus supervene. When the *joints* are affected, the synovial membranes are the chief parts implicated, and generally in consequence of the same pathological conditions as have been shown to originate with the emunctories; and these conditions, by contaminating the blood, affect these parts in an analogous manner to the affection of the serous membranes; and, in some instances, and in certain epidemics especially, give rise to severe pains, resembling those of gout or rheumatism of the joints. In these cases the treatment should not vary much from what has been advised for articular rheumatism or gout. Generally warm anodyne fomentations, or a combination of these with terebinthinate embrocations, and the use internally of the means already advised, and particularly of such as the state of the urinary excretion will suggest, are sufficient to remove this consecutive affection. If erysipelas, or either of its consequences should appear, the treatment for that disease ought to be adopted.

127. iii. REMARKS ON CERTAIN REMEDIES ADVISED FOR SCARLATINA.—After the full exposition of the *treatment of the several forms, complications, and sequelæ of scarlet fever*, which I have endeavoured to give, my remarks on this head will be brief, and be confined to those means which are most important.—(*a.*) *Bloodletting*, either general or local, or even both, have been recommended by BORSIERI, SCHRADER, GRUNDMANN, ARMSTRONG, CRAIGIE, and many others; but the impropriety of having recourse to it generally, or even frequently, in some epidemic prevalences of the malady, has been demonstrated by very numerous authorities. It would be improper to decide categorically either in favour or against the practice; for the character of the prevailing epidemic constitution, of the existing form or type of this fever, and the several circumstances of the case and of the patient, may render vascular depletion either most beneficial or most injurious. The propriety of the practice and the benefit resulting from it must necessarily depend upon the judgment of the physician, as respects not only the peculiarities of the case that especially require it, but also the extent to which it should be carried, and the period and mode in which it should be resorted to. If the practice be adopted suf-

ficiently early in the attack, and be aided by judicious means, *local bleeding* by cupping over the loins will be sufficient. A quantity of blood, as large as the exigencies of the case can require, may be taken in this way, and with a more decided effect as respects the organ which is most concerned in developing the most serious complications and symptoms of the malady, and in producing those changes which are usually termed malignant. In very young children a few leeches may be substituted, but the quantity taken by cupping is correctly ascertained, and hæmorrhage is prevented from being troublesome. The loss of blood in this way is also less felt, and less injurious than by venesection, in doubtful cases; and even when early employed in those cases or epidemics, which seem to contra-indicate the propriety of it, much less injury results from this mode than by any other.

128. (b.) *Emetics* have been strongly recommended by FOTHERGILL, WITHERING, STOLL, JOHNSTONE, CLARK, LENTIN, HUFELAND, and many others; but they have been unaccountably neglected in modern practice. I can assert that there is no remedy more generally appropriate — so suitable to all forms of the disease, if the substance be duly selected, and the periods of exhibition altogether proper. In most instances an emetic should be given as early as possible, and when given thus early, and before the type or character of the disease has fully declared itself, then ipecacuanha, or this with sulphate of zinc, may be preferred. When the disease is more fully developed, and assumes a sthenic or inflammatory character, then emetic tartar, or a combination of this with ipecacuanha may be prescribed, and cupping over the loins to an amount indicated by the symptoms and its effects may precede the emetic. When the disease presents malignant characters or manifest adynamia or putro-adynamia, then sulphate of zinc with capsicum, &c. may be preferred, and dry-cupping only be employed. An early recourse to emetics frequently prevents the occurrence of inflammatory symptoms on the one hand, and of malignancy on the other. But the exhibition of them, especially of the one last named, should not be confined to the earlier periods of the malady. The state of the throat, or the extension of disease to the larynx, may require a recourse to this practice oftener than once during the course of the disease; and in the low or advanced states of the malady the combination of the emetic, whether ipecacuanha or sulphate of zinc, with stimulants and hot spices, will be of advantage. When tartar emetic is prescribed as an emetic in divided doses for children in scarlatina, it sometimes fails of producing this effect, and if the exhibition of it be persisted in, even for a short time, it may produce dangerous or even fatal sinking, although the form of the disease may have been more than usually sthenic or inflammatory when it was first prescribed.

129. (c.) There are few remedies which require more judgment in their exhibition and selection in scarlatina than *purgatives* and *aperients*. For if they be given at the period of eruption, especially when the efflorescence is being evolved, they may interrupt the regular course of the disease; and if they be too long omitted, the retention of morbid secretions and excretions may be equally detrimental. If again they are of a too irritating

kind they may develop an enteric complication, or, in the more asthenic forms, seriously depress or exhaust the patient. They are often exhibited with much benefit, as already advised (§§ 102. 165.), after an emetic has operated, when the patient is first attacked, and before the eruption begins to appear. After this period, or during the eruption, if the disease assumes a regular course, mild aperients, sufficient merely for the prevention of accumulations of the excretions, are only required. If, however, determinations to the head or suppressed function of the kidneys supervene, then the more active purgative, conjoined with calomel, terebinthinate enemata, &c. already mentioned, are of service. When the disease assumes an asthenic or malignant form, the purgatives should be conjoined with tonics, stimulants, and aromatics, as with cinchona, cascarilla, gentian, ammonia, spices, &c. In the more regular forms, purgatives are generally of greater service upon the disappearance than during the continuance of the eruption; and in every circumstance the combination with them of the alkaline carbonates or sub-carbonates is most beneficial. The indications for or against a recourse to purgatives, and the choice of them, depend upon the type, form, and complication of the disease, and upon the states of the alvine functions and evacuations, which ought to be always carefully examined.

130. (d.) Preparations of *cinchona* and other *tonics* have been much employed in the treatment of the malignant and asthenic scarlatina; and in these forms especially, after the exhibition of emetics and after morbid secretions and excretions have been duly evacuated, and after cupping or dry-cupping has been employed, in cases requiring either or both, these medicines are most beneficial; much, however, depending upon the selection and combination of them with other means. Vascular depletion early in the disease may be beneficial, and yet the exhibition of tonics may be imperatively required at a more advanced period. But a recourse to the latter should very much depend upon the state of the urinary function. Most of the earlier writers on the disease since the time of MORTON, and especially those who observed chiefly the more malignant types, have insisted much upon the necessity of recourse to *cinchona*, in the forms either of powder, decoction, or tincture, especially HUXHAM's tincture. But even in these types this medicine is best prescribed as just advised; and if the urine be suppressed, bloody, very scanty, and very high-coloured, cupping even in these ought to precede the administration of this remedy. In cases which suggest doubts of the propriety of having recourse to it, the infusion or decoction, conjoined with the liquor ammoniæ acetatis, with the acid or with the alkali in excess, or with nitrate of potash, according to the peculiarities of the case, and with spirit of nitric æther, will never be injurious, but most frequently very beneficial. When symptoms of malignancy are unequivocal, and the urine not suppressed, the decoction with the compound tincture of cinchona, or with tincture of serpentaria and carbonate of ammonia, and sometimes also with the bicarbonate of potash or soda, will be of service; or the mineral acids, especially the *hydrochloric*, or *nitro-hydrochloric acid*, with the æthers, may be given in the decoction of the cinchona when the urine indicates the

propriety of exhibiting these in preference to the alkaline carbonates. If the bark affect the bowels, the *cascarilla* or *willow bark* may be substituted, or *salicine* may be employed. Other tonics, or tonic febrifuge preparations, may be prescribed in mild cases; but in the malignant type, these just mentioned, or the sulphate of *quina* conjoined with camphor, and other substances noticed when treating of the malignant form of the malady (§§ 107. *et seq.*), are most deserving of adoption.

131. (*e.*) *Stimulants* are required in the asthenic forms of the disease, and often at an advanced stage of the more sthenic type, but generally in conjunction with other means. The *sesqui-carbonate of ammonia* was strongly recommended by PEART, and is certainly often most beneficial when combined, as above advised, according to the peculiarities of individual cases. It is frequently prescribed in too small and consequently in inefficient doses; and the same remark applies to the *æthers* and their preparations. When a tonic and antiseptic effect is desired, ammonia should be conjoined with the preparations of cinchona and camphor; and when a diaphoretic action is indicated it should be given with the solution of the acetate of ammonia and spirit of nitric æther. The æthers are most useful when the patient complains of sinking faintness, or leipothymia. With quinine and compound infusion of roses, *sulphuric æther* may be preferred; and with the decoction of bark, and hydrochloric acid, or the nitro-hydrochloric acid, *hydrochloric æther* may be prescribed. The *chlorate of potash* may be conjoined with tonic infusions or decoctions, or with alkaline carbonates and æther; and in the more malignant states of the disease these medicines should be ordered in frequently repeated doses, and be further aided by *camphor*, *musk*, *serpentaria*, or *capsicum*. The combination of camphor with spirit of Mindereri was much confided in by HUFELAND in this class of cases. A recourse to *wine*, or even to *brandy*, in the forms mentioned above (§§ 109.), may not only be of service, but even indispensable, in the more asthenic and malignant states of the disease.

132. (*f.*) *Diaphoretics* and *diuretics* are medicines of great importance in this disease. The functions of the skin and kidneys are interrupted by the active vascular congestion, and by the alteration of the organic nervous influence of these parts, and therefore, whilst means are being used to equalize the circulation and to relax the cutaneous surface, medicines should be prescribed to aid these intentions, and to rouse the secreting and depurating actions of these organs. In the more sthenic or inflammatory types, and at the commencement of the disease, the antimonial diaphoretics, conjoined with the solution of the acetate of ammonia and spirit of nitric ether, or with nitrate of potash, will generally be of service, even although they may fail of materially promoting the functions in question. But, in other states of the malady, diaphoretics of a warm and restorative nature, or a combination of the more common diaphoretics with stimulants and antispasmodics, as with ammonia, the æther, &c. especially after the tepid or warm bath has been resorted to, will be found most beneficial.

133. *Diuretics* should be given in similar combinations to those now advised, in the asthenic or malignant form of scarlatina; but in this

form, and in the advanced stages more especially, the most certain diuretic is the spirit of turpentine administered in an enema, or the terebinthinate epithem or embrocation applied over the loins, as already mentioned. During desquamation, when the kidneys are frequently congested or the tubuli obstructed by the desquamated epithelium, the supertartrate of potash and biborate of soda, or the acetate or citrate of potash with either the acid or the alkaline carbonate in excess, or any of the saline diuretics, or others mentioned in the article DROPSY (§ 135. *et seq.*), when describing the treatment of *anasarca*, will be appropriate.

134. (*g.*) Besides the above, *various means* have been recommended by writers, in the treatment of scarlatina, as either empirical remedies or as antiseptics and stimulants. The most serviceable of these, when judiciously employed, are the mineral acids, the alkalies, and certain vegetable acids and products. Of the *mineral acids*, the most beneficial are the hydrochloric and the nitro-hydrochloric, either in simple dilution, or conjoined with the decoction, or infusion of cinchona, or with camphor, or with these and the hydrochloric æther. Of the vegetable acids, the *acetic* and the *citric* are the most useful. The former has been frequently employed both internally and externally, since the earliest irruptions of the malady in an epidemic form, chiefly on account of its antiseptic property; and with reference to this virtue I have often employed it; but more recently I have preferred the *pyroligneous acetic acid*, either combined as above, or given with creasote, or other antiseptic agents, in the more malignant states of the disease. *Citric acid* is also beneficial in similar circumstances; but whilst I have considered it as preferable to the common acetic acid, I have believed it inferior to the pyroligneous. Either of these acids is often beneficial; but the vegetable acids now recommended should be given more liberally than they usually are.

135. *Chlorine* and the *chlorides* are also very excellent remedies in the more malignant states and advanced stages of scarlatina, their influence being aided by other restorative means, as cinchona, serpentaria, camphor, musk, capsicum, &c. *Chlorine* was first prescribed by BRAITHWAITE; and its excellent effects in the more malignant states of the disease have been acknowledged by many British and foreign authorities. The *chlorine-water*, of the Dublin Pharmacopœia, may be given in doses suitable to the age of the patient, in camphor mixture, or in any other proper vehicle. *Alkaline carbonates*, both the volatile and the fixed, have been recommended by many authorities in scarlatina. They may be prescribed with the remedies just named, and in the states of the disease, and in the combinations mentioned above (§ 108.). *Nitrate of potash*, in full and frequent doses, has been advised by FRUNK; and it is often of service when associated with other means which are appropriate to the peculiarities of the case, more especially with camphor and others already noticed. The use of *colchicum* has recently been recommended; but it is a hazardous agent even in the more sthenic forms of the malady, as its injurious operation is liable to be confounded with the unfavourable course of the disease. It should be given only in similar states and circumstances of the case to

those for which I have admitted that the tartrate of antimony may be prescribed.

136. (*h.*) *Gargles*, or, preferable to these, stimulating *lotions* or *washes*, with a strong solution of the *nitrate of silver*, or of powdered *alum* in the pyroligenous acid, are often extremely beneficial, when employed early in the anginous form of the malady, especially when the affection of the throat assumes an asthenic, malignant, or offensive character. Either of these solutions, or others already mentioned (§§ 109.), should be applied early by means of a camel's-hair brush, or of sponge, in the manner already pointed out; and the solution should be strong in proportion to the malignancy of the affection. At the same time as these means are being used, the external applications to the throat, about to be noticed (§ 140.), should be resorted to, and the tonic, restorative, and antiseptic medicines, mentioned above, ought to be administered. A strong solution of the *bichloride of Mercury* has been recommended by Dr. SAUTER to be used as a gargle in the more asthenic affection of the throat; and, judging from my experience of it as a gargle in analogous affections of this part, it is very likely to prove of service. In some of the more prolonged cases, and when the tonsils are much enlarged, I have directed the parts to be pencilled with the *tincture of Iodine*, and if there be, as often observed, much external swelling, after the eruption has disappeared, I have prescribed the same application externally. In less malignant cases, the chloro-sodaic solution of LABARRAQUE in the proportion of an ounce to five of camphor water and half an ounce of honey, is a very useful gargle; or the decoction of contrayerva with hydrochloric acid and tincture of capsicum; or a filtered solution of the confection of roses with the same acid and tincture, or the tincture of myrrh, and camphorated spirit, may be employed in still less severe forms of the disease.

137. (*i.*) *Cold*, in various modes of application, has been resorted to for the removal of the pungent heat of the surface, which is believed to increase not only the distress of the patient, but also the vascular action and the exhaustion of organic nervous power. It may always be safely applied when the skin is very hot and dry. Various modes of employing it have been advised. BEDDOES directed a free current of *cold air* to pass over the patient. But in resorting to this mode of reducing the temperature of the surface, the respiratory passages and organs may suffer, and the complications described above, especially bronchitis, pneumonia, pleuritis, or peritonitis may be thereby occasioned; or the eruption may be suppressed. The obvious benefit resulting from treating the patient in a large airy apartment, where the temperature is cool, rather than very cold, and in which the air is being continually renewed, should never be overlooked; and the bed and bed-clothing ought to be cool and light, especially during the eruptive stages: but subsequently both the one and the other ought to be so regulated as to favour the restoration of the cutaneous functions, and to equalize the due distribution of the blood.

138. The *affusion of cold water* over the surface of patients in scarlatina, so strenuously advised by Dr. CURRIE, and so generally and indiscriminately practised during the commencement of this century, has been found beneficial early in

the more sthenic and regular forms of the disease. But an injudicious recourse to this practice in asthenic, malignant, and complicated cases, has brought it into disrepute. In the hands, however, of a discriminating physician—of one capable of interpreting aright existing pathological states, and of selecting and applying judiciously medicinal agents for the removal of these states—the cold affusion is still deserving of estimation. I have, however, preferred in most circumstances, *cold* or *tepid sponging* of the surface, adapting the temperature, and the fluids employed, to the peculiarities of the case—*cold* or *cool fluids* at an early stage and in sthenic cases, and *tepid*, or even *warm fluids*, at an advanced period, and in the asthenic or malignant forms, whenever the skin is hot and dry. These are in many respects preferable to affusion, for they may be more frequently resorted to, and may be employed for a longer time, without exhausting the patient. The fluids which may be selected for this purpose deserve some notice. I have usually directed equal parts of vinegar and water, or of spirit of Minderrie and water, or camphor water, during the early stages; but have subsequently employed a weak alkaline solution, or a solution of borax, as being more likely to facilitate the restoration of the functions of the skin, during the advanced stages, and to prevent the affection of the kidneys and the dropsy often supervening as sequelæ of the disease. Frequent sponging of the surface with a solution of the *nitro-hydrochloric acids*, of a tepid or warm temperature, according to the state of the case, will be found of much service in the malignant and asthenic forms of the malady.

139. (*i.*) *Baths, tepid* or *warm*, according to the period of the disease and the peculiarities of the case, are often beneficial. The tepid bath in the earlier stages, generally lowers the heat of the skin, mitigates the uneasiness and burning attending the eruption, and relaxes the surface. When the disease is further advanced, especially if it be complicated, then the *warm bath* may be preferred; and when the eruption has suddenly or prematurely disappeared, salt and mustard may be added to the water. If a warm bath be required during desquamation, or if any of the sequelæ of the disease supervene, the alkaline sub-carbonates, or the baborate of soda, will be a very useful addition; and if the complication be of a very serious character, mustard may be added. A frequent recourse to warm baths, during desquamation, will generally prevent the sequelæ of scarlatina, especially if the alkaline additions just mentioned be made to the baths.

140. (*k.*) *Embrocations* and *external applications* of various kinds have been employed; but they are required chiefly for the severer states, and internal complications of the malady; or when the eruption either does not come out, or prematurely disappears. *Blisters* are most hazardous applications for children in this disease, and are generally so in proportion to their youth. In the mild and regular forms they are not required, and in the malignant or complicated may produce gangrene of the part. They are sometimes of service in adults, especially at an advanced stage, and when due reference is made to the state of the urine. *Mustard poultices* are often of use in the circumstances just mentioned; but in the more malignant type of the disease, in very young subjects, they

may be followed by effects almost as dangerous as those produced by blisters, if they be too long or injudiciously applied. The *embrocations* and *epithems* prescribed above (§ 101.) and in the APPENDIX (Form. 295, 296, 307, 311.), are the most efficacious, and are attended by none of the risks and ill effects often produced by blisters, and other external derivatives and counter-irritants. When properly employed, especially soon after a warm or tepid bath, they powerfully promote the functions of the skin; and, by the absorption of their fumes, chiefly by the lungs, they tend to restore the secreting and excreting functions generally. The application of these, in the several states of the disease, has been pointed out in the remarks already offered.

141. (l.) The diet and regimen of the patient must depend, in some measure, upon the type and the stage of the disease, upon the peculiarities of the case, and the circumstances of the patient. In the more regular, sthenic, or inflammatory forms, and in the more complicated cases, especially if the complications occur at an early stage, the diet and regimen should be antiphlogistic. Barley-water, thin water-gruel, &c. are generally sufficient during the earlier periods; but afterwards, and from the commencement in the more asthenic or malignant types, seltzer- or soda-water with milk may be given; and as the disease proceeds, or begins to assume putro-adyynamic or malignant characters, spruce-beer, soda-water, or seltzer-water with wine; sago, arrow-root, or tapioca with wine, or even with brandy in some cases, may likewise be prescribed; beef-tea, chicken or other broths being also allowed according to circumstances. Due ventilation should always be insisted on, avoiding however, currents of air, especially during desquamation; the bed and bed-clothes being regulated according to the type, character and stage of the disease, as above advised (§§ 97. *et pluries.*). In order to prevent the usual sequelæ of the disease, during desquamation and recovery, the diet and regimen of these periods ought to be strictly prescribed, conformably with the advice already given (§§ 120—123.); and, if *anemia* or much *debility* be observed, the treatment prescribed for these, in the places referred to, should be adopted. (See arts. BLOOD, *Deficiency of* (§ 48.), and DEBILITY (§§ 35. *et seq.*).

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SCIRRHOUS AND OTHER MORBID

GROWTHS. — *SYNON.* — *Squirrhous* (*σκιρπος*,
 hard), *Scirrhomæ*, *Scirrhis*, *Carcinos*, *Indu-*
ratio maligna; *Cancer scirrhus*, *C. fibrosum*;
Carcinoma, *Celsus*; *Encephaloma*; *Scirrho-*
fungus; *Scirrho-encephaloid*; *Scirrho-en-*
cephaloma; *Scirrho-cancer*; *Scirrho-colloid*;
Colloid, *Colloid tissue*, of recent writers; —
Καρκινος, *Hippocrates*, *Galen*; — *Skirrhus*, *Car-*
cinoma, *Swediaur*; — *Carcinus*, *Good*; — *Krebs*,
Krebsschaden, *Skirrus*, *Germ.*; — *Scirrhe*, *Car-*
cinome, *Fr.*; — *Scirrho*, *Ital.*

SCIRRHOUS AND OTHER TUMOURS. — *Adventitious*
Growths. — *Malignant and Non-Malignant*
Tumours. — *Cancerous and Non-Cancerous For-*
mations. — *Cancer and Cancroid Growths*,
J. H. Bennett.

CLASSIF. — See CANCER and FUNGOID
 DISEASE.

1. DEFIN. — SCIRRHO-CANCER. — *A morbid*
growth or structure possessed of the power of ex-
tending itself, or of redevelopment after removal,
and arising from constitutional vice.

2. NON-MALIGNANT GROWTHS. — *Structures*
which are adventitious, and possess the power
of extending themselves locally, but which do not
return after removal, nor contaminate the con-
stitution.

3. PROFESSOR BENNETT has defined true cancer-
 ous growths to consist of a structure which, "once
 existing may spread to other tissues or organs,
 causing in them a disease or growth similar to
 itself, by a species of propagation similar to that
 possessed by animalcules or vegetable fungi." In
 the articles in this work devoted to the considera-
 tion of the chief forms of CANCER, *scirrhus* has
 been treated of in its principal pathological and
 therapeutical relations (see arts. CANCER, DISEASE,
 §§ 141, 142, and FUNGOID, or FUNGO-HÆMATOID
 DISEASE). Since these were published, the re-
 searches of several eminent British and Foreign
 physicians have appeared and have added con-
 siderably to our knowledge of the intimate struc-
 ture of cancerous growths, into which the scirrhus
 conformation enters more or less, and upon which
 the other forms of cancer often supervene or are
 engrafted. Most of the recent writers on cancer-
 ous formations have described the microscopic ap-
 pearances of these formations; but they rarely
 agree as to what really constitutes the cancerous
 elements of structure; and hence they contribute
 comparatively little to the diagnosis between truly
 cancerous and non-cancerous growths; and that
 little is neither generally nor readily applicable
 in practice; whilst it in other respects does not tend
 to the advancement of practical knowledge. The
 purely practical physician, however scientific and
 rational his acquirements, may, perhaps, value the
 researches of the "*Histologists*" — as the micro-
 scopic observers, conformably with Germanic
 custom, denominate themselves — at too low an
 estimate; but there is little risk of any of them
 falling into this error, however they may fail in
 adding to our knowledge of the causation, pre-
 vention, or removal of the diseases which they
 microscopically investigate. Nevertheless, the in-
 formation which they furnish ought not to be
 neglected; but should stimulate others, by its
 very deficiencies — by showing how little is really
 obtained by carrying us a step or two forward in
 our analysis — by comparing numerous discre-

pancies, opposite views, apparent differences, contradictory assertions, &c. — to attain greater precision of observation and description, unbiassed by hypothesis or hastily formed opinion.

4. All the forms of cancer were, up to an early period of the present century, limited to — 1st. Scirrhus-cancer and Carcinoma; and 2d. to Fungus Hæmatodes, or Hæmato-fungoid disease. To these were successively added, 3d. Encephaloma; 4th. Colloid disease, and 5th. Melanosis. Encephaloma, or encephaloid tissue, and hæmato-fungoid disease are evidently identical; the former being a more remarkable development of the brain or milt-like production than the latter, which presents, with more or less of this production, a much more remarkable state of abnormal vascular development. Colloid formation has greater claims to the rank of a variety of scirrhus-cancer, although it is often associated with, or approximates to, the scirrhus structure. Melanosis should be viewed as a distinct formation; and not more intimately connected with true cancer than are tubercles. Amongst the earliest investigators of the microscopic structure of scirrhus-cancer, MÜLLER is most deserving of mention. In his work he divides scirrhus-cancroid growths into the following varieties: — 1st. Carcinoma fibrosum seu simplex; — 2d. Carcinoma reticulare; — 3d. Carcinoma alveolare; — 4th. Carcinoma melanodes; — 5th. Carcinoma medullare; — 6th. Carcinoma hyalinum seu fasciculatum. VOGEL reduced the varieties to *four*: — 1st. Cellular cancer; — 2d. Fibrous cancer; — 3d. Melanotic cancer; — and 4th. Colloid cancer. GLUGE distinguishes only *three* forms: — 1st. Fungus medularis; — 2d. Scirrhus; — and 3d. Cancerous ulcer. Dr. WALSHE, and more recently professor BENNETT, consider that there are only three forms of cancer, properly so called, namely, (*a.*) Scirrhus, or hard; (*b.*) Encephaloma, or soft; and (*c.*) Colloid or jelly-like cancer. All the forms mentioned by morbid anatomists may, they think, be readily comprised under one or other of these heads.

5. Professor BENNETT remarks, that “when we endeavour to define what a cancerous growth really is, according to the description of morbid anatomists, or the symptoms of medical practitioners, we are at once thrown into a crowd of inconsistencies, from which the sooner we emancipate ourselves the better. This can be only done by attaching the term cancer to some characteristic structure. LEBERT has endeavoured to do this, and to establish that the existence of the *cancer-cell* is pathognomonic; that it may be distinguished from every other kind of cell formation, and at once indicates the nature of a cancerous growth.” But Dr. BENNETT adds, that the numerous observations which he has made obliges him to differ from M. LEBERT, and rather to agree with MÜLLER in thinking that no single element is diagnostic of scirrhus-cancer. The circumstance that no individual element is characteristic of cancer led MÜLLER to maintain that there is no histological difference between it and healthy textures. This also induced VIRCHOW to coincide with him in the opinion, that “carcinoma is no heterologous tissue, and its finer parts are not essentially different from the tissues of benignant textures and the primitive tissues of the embryo.” If this be true, much indeed, nearly all that I

have to add, under this head, to what I have already written on scirrhus-cancer, or malignant growths, may be spared; and I might join Dr. WATSON in remarking that “microscopic observers say, that, in their minute and original structure, there is no perceptible distinction between the most innocent and the most malignant growths; nay, that both agree in their primary corpuscular elements with the healthy tissues of animals and even of plants. This very agreement, if it really be so complete, shows that in *classifying* morbid growths, we must reject the aid of the microscope, and attend to their proper and more palpable features.” — (*Princip. and Pract. of Physic.* 3d Edit. vol. i. p. 217.)

6. But the “Histologists” aver, that the microscope alone can furnish the diagnosis and the basis of classification, and it alone; and as they include in their ranks illustrious names, notwithstanding equally illustrious dissentients, it is due to them to hear their statements and weigh their arguments. Professor BENNETT observes, that “this dispute as to whether a cancerous growth be heterologous or homologous (LAENNEC), heteromorphous or homomorphous (LEBERT), arises from two modes of viewing the subject. If any one individual element be chosen as the test of comparison, then it does not essentially differ from others existing in healthy tissues, and the structure is *not* heterologous; but if several be chosen, and their relation to each other studied, then they differ from those in normal textures, and they *are* heterologous.” (*Op. cit.* p. 171.) VOGEL says, that “our diagnosis must be based, not so much on the coarser physical characters, which in cancer are liable to extreme variations, as on the histological relations as viewed through the microscope.” Before, however, the consideration of the distinctions which histologists believe may be drawn by means of the more powerful microscopes, it will be necessary, in the *first place*, to take a view of the *elements* assigned by them as entering into the structure of scirrhus-cancer and morbid growths. According to Professor BENNETT, the latest writer on morbid structures of a scirrhus-cancerous and canceroid nature, the following elementary forms enter into their composition: — 1st. Molecules and granules; — 2d. Naked nuclei; — 3d. Cells of various kinds; — 4th. Filaments or fibres; — 5th. Blood-vessels; — 6th. Crystals. These he considers as the elements of all morbid products. And agreeably with his own researches and with those of several other observers, he states that there is not any thing characteristic of cancer in either of these elements when viewed alone; and that it is only in relation to each other that they become important. — In this article I shall consider the elementary structure of both SCIRRHO-CANCEROUS and CANCEROID GROWTHS — of both MALIGNANT and NON-MALIGNANT TUMOURS; and shall follow the arrangement and researches of Professor BENNETT.

7. I. ELEMENTS OF MORBID GROWTHS. — i. MOLECULES and GRANULES are described by Dr. BENNETT as varieties of the same form. A *molecule* he defines to be a minute body presenting no determinate edge or internal centre; a *granule*, a body which varies in size, and is distinguished by a distinct margin, the external edge of which is abrupt. When transparent, granules refract light and present a bright or dark centre, according to the

focal point in which they are viewed. A molecule may become a granule under a greater magnifying power, and the latter appears as the former under a less power; so that there is actually no real distinction between these two organic elements. These bodies seem to vary in composition. They may consist of various kinds of fat, and disappear on the addition of potash or ether; or they may be albuminous, and be partly dissolved by acetic acid; or partly fatty and partly albuminous; or they may consist of pigmentary or mineral matter. A granule may be so large as to be called a globule; such as the bodies found in milk. Molecules and granules differ in shape; in general they are spherical, but they are sometimes more or less angular; they may be isolated, or grouped, forming granular masses; they may exist alone, or be mixed with other elementary forms. Dr. BENNETT considers them the most universal element in tissues, and of the greatest importance in their indications of the nature of structure.

8. These bodies appear to be formed *primarily* by precipitation, and *secondarily* by disintegration. The *primary* change in the germinating seed or ovum is the gradual appearance, in a transparent fluid, of numerous molecules and granules, which, by coalescing or enlarging, are gradually changed into more compound structures. The *secondary* formation is when a structure decays, and gradually breaks down into an organic or animal debris; this is resolved into granules and molecules, which are ultimately reduced to a fluid state and are absorbed. Thus there may be granules of evolution and granules of disintegration. (BENNETT.) Molecules and granules have distinct movements of their own; they turn round in a liquid with a tremulous movement. In the interior of cells these movements are often well marked, and very regular. "When we magnify a salivary globule 600 or 800 diameters linear, we can see the minute granular contents in a state of continual vibration, or revolving in circles of extreme minuteness. In certain vegetable cells these circles are enlarged so as to constitute a visible circulation. We frequently find molecules and granules encrusting or attached to larger globules, and they, doubtless, occasionally serve to assist the progress of development. Sometimes they are attached together in masses, at others repelled and kept isolated. Similar facts may be observed wherever minute solid particles are seen floating in fluids, which prove that the movements of the minutest molecules are governed by laws as definite and fixed as those which rule the planets revolving in space.

9. "Molecules and granules may be produced mechanically, and are thus capable of being subjected to the same laws as those which are formed naturally. Thus, the pigmentary and mineral granules precipitated by the chemist are identical with those precipitated in living fluids. Again, when transparent oil and transparent albumen are brought into contact, a precipitation in a membranous form takes place at the point of union. Thus, a drop of oil cannot for a moment be surrounded by an albuminous fluid, without its being inclosed in a vesicular membrane or cell. Rubbing the two drops of oil and albumen together resolves them into granules composed of a minute particle of the one surrounded by a thin film of the other, which granules are identical with those found in animal fluids. Now, when it is

remembered that oil and albumen pervade all organised bodies, that they are continually coming in contact, and that membranes and cells must thereby be necessarily produced; moreover, as the other soluble elements which enter into organised structures must communicate to the fluids various kinds of densities,—it will be clear that all the physical conditions necessary for endosmosis and exosmosis must be present. When, in addition, it is considered that modern anatomy and physiology have demonstrated that all organised structures consist of granules, nuclei, and cells, composed, in like manner, of a membranous envelope, and endowed more or less with the same physical properties, the importance of these facts must be recognised." (p. 140, 141.)

10. Professor BENNETT considers it in the highest degree probable that all blastemata—(*blastema* or *cytoblastema*, or the *amorphous plasma*, which gives origin to cells or organised formations; see art. Pus, § 2.)—containing the necessary nutritive principles in solution, precipitate minute oily particles, which are the elementary granules of histologists. These, either separately or united, constitute nuclei composed of oil, surrounded by an albuminous membrane. In this condition they become subject to the physical law of endosmosis and exosmosis, and absorb or exude materials, according to the circumstances in which they are placed, and the unknown vital power to which they are subjected. "It must always be remembered that the granules produced mechanically by the union of oil and albumen, are not vital structures; but when formed in the animal body, under certain conditions, they become so. The physical relations pointed out are only necessary preliminary steps for the addition of that unknown force we call vitality, which directs the ultimate form these structures assume. They are a *sine qua non*, without which vitality cannot be called into existence. The different cells entering into the composition of the tissues are not formed from them directly as ASCHERSON supposed, but are the result of a series of physical and vital changes occurring in the elementary granules and nuclei, which, however, are themselves produced in the manner he pointed out." (p. 141, 142.) Instead, however, of saying that the physical conditions or relations here adverted to "are a *sine qua non* without which vitality cannot be called into existence," it would be more correct to say, that they are the simplest and the earliest material or physical entities with which vitality is allied, and that, with the agency, or under the influence of this alliance, they are capable of passing through a series of changes of a more and more complex kind;—that, although vitality could not be manifested without such material entities or alliances, in their earliest as well as in their progressively advanced states, the development and preservation of these states are entirely owing to the vitality with which such material entities are endowed from their earliest periods, and in their simplest forms, of existence. Dr. BENNETT concludes, that the above considerations lead to a generalisation that is of some importance, namely, that the molecular element is the real basis of all the tissues, and not the cell, as maintained by SCHWANN, or the nucleus, as is contended for by HENLE; for no cells are formed without nuclei, and no nuclei without granules; and it is a know-

ledge of the laws regulating the deposition of the latter in an exudation, and within nuclei and cells, that must guide us to a rational therapeutics, so far as the diseases of nutrition are concerned.

11. ii. **NAKED NUCLEI.** — Nuclei may be formed, according to Professor BENNETT, *primarily* and *secondarily*. — 1st. By the aggregation or confluence of molecules and granules, upon which a cell-wall is afterwards formed, “during the transformations of which the nucleus may remain permanently, may undergo a species of development, or completely disappear.” — 2d. The original nucleus may expand and form the outer cell-wall, and another nucleus may be produced within it, also by the deposition and confluence of granules, which, by division, or the formation of other internal nucleoli, produce new nuclei and cells. “In either of these cases, occurring in healthy or morbid tissues, we may observe the nuclei of cells in all stages of their growth, and can have little doubt as to the progressive steps of their production.” Dr. BENNETT considers that the nuclei formed in scirrho-cancerous and canceroid growths are produced in the same way as similar bodies in other textures; and that, when seen in well-formed cancer-cells, they are for the most part secondary — that is, formed subsequently to the cell-wall which incloses them. He has, however, often found numerous naked nuclei mingled with the fibrous stroma. In some of these, doubtless, their occurrence is explained by the breaking down and disappearance of the cell-walls, which at one time inclosed them. In this manner *free nuclei* occur secondarily, and are the result of disintegration; but, at other times, they are undoubtedly a primary formation, existing in an advancing, and not in a retrogressive growth, and are then often unconnected with cells. Whether free nuclei are ever capable of producing similar bodies, as BRUCH believes, without the agency of cells, is very doubtful. But Dr. BENNETT considers them in no way necessarily connected with cancerous growths. In some instances they are associated with fusiform corpuscles; and are observed either to be identical in form and appearance with their nuclei, or as elongating to constitute that corpuscle itself—a transformation rendered very probable by their appearances in several cases. “The true signification of these free nuclei is in some instances difficult to determine; for, whilst we may occasionally with M. LEBERT consider them as fibro-plastic, in progress of development into fibres, and at other times the remains of broken-down cells, the result of disintegration, there are other instances where the growth is advancing, and where there are no evidences to warrant either of these explanations.” If they be connected with the fibrous element, it is easy to conceive that any of them remaining in a tissue may cause the return of a swelling in the cicatrix, or in the situation of a former tumour. But Dr. BENNETT is unacquainted with any fact which proves that a growth consisting of great multitudes of free nuclei among the fibrous stroma ever possesses the power of spreading to other tissues, as is the case with cancer. “It is therefore probable, that as granules, which are in many respects identical, may be transformed into the nuclei of different textures; so nuclei, which are alike, may be connected with fibres, or with various kinds of cells. Of the laws regulating

these transformations we are ignorant; but as there are no granules distinctive of cancer-nucleoli, so there are no nuclei distinctive of cancer-cells. Moreover, the observations alluded to show the necessity of considering nuclei as bodies distinct from cells. They may occur alone with fibres, producing a texture which may be called fibro-nucleated.” KÖLLIKER and HENLE have described the occurrence of diaphanous bodies floating among various tissues. Dr. BENNETT has frequently seen these not only in cancerous and canceroid growths, but also in a variety of morbid products, and in the fluid squeezed from the lungs in catarrh and from other oedematous tissues. He thinks that they may present a certain stage in the development of the nucleus, but that they are more probably nuclei enlarged by the endosmosis of fluid, a view which is favoured by the fact of their frequency in textures which are softened or infiltrated with serum.

12. iii. **CELLS.** — Professor BENNETT states that there is no kind of cell-formation which, at all times and under all circumstances, is capable of being distinguished from every other form of cell-growth. Nevertheless, very characteristic differences may exist among cells, the study of which is of the greatest service in distinguishing one tissue from another. These differences principally depend upon the age or state of development, the situation in which the cells are formed, and a variety of concomitant circumstances, all of which should be taken into account before an accurate opinion as to their nature can be formed. The different kinds of cell which Dr. BENNETT has observed in scirrho-cancerous and canceroid growths are—1st, The cancer-cell;—2d, Epithelial-cell;—3d, Cartilage-cell;—4th, Compound granular-cell;—5th, Fibro-plastic and fusiform-cell;—6th, Pus-cell. These names he admits to be open to objection, but he has none other to substitute for them. One viewed by itself is often not to be distinguished from another. It is only when occurring in groups, or examined in relation to surrounding textures, that these terms becomes significative. An exact appreciation of each is of the utmost importance in the microscopic study of morbid growths.

13. A. **Cancer-cell.** — Dr. BENNETT's description of this cell is the most elaborate. He states that it exists under numerous forms, presents very different appearances at different times, and is of variable size. In form it is either round, oval, caudate, spindle-shaped, oblong, square, heart-shaped, or of various forms, from pressure on its sides. The external edge is generally sharp and well-defined on the field of the microscope. It varies in size from 1-100th to the 1-10th of a millimetre in diameter; the former size occurring in a very early stage of its development, the latter when the cell is old, and contains other cells. It is most commonly 1-50th to 1-30th of a millimetre in diameter. The cell is destitute of colour, except in melanotic cancer, when the pigment-granules it contains tinge it of a light or dark bistre brown, passing into deep black. The cell-wall, when young, is smooth and distended; when old, it is more or less corrugated and flaccid. Its contents are various. There is always one nucleus, often two, and sometimes from three to nine. Most frequently there is only one, which is round or oval, generally the latter, and

contains one or two granules or nucleoli. The nucleus, like the cell itself, varies in size, and may occupy from 1-6th to 4-5ths of its volume. Between the nucleus and cell-wall there is a colourless liquid, which, at first transparent, becomes afterwards opalescent, from the presence of molecules and granules. On the addition of water, the cell-wall becomes distended by endosmosis, and is enlarged. Syrup and thick muci-lage cause it to shrink and contract by exosmosis. The addition of acetic acid renders the cell-wall more transparent, and dissolves the young cells; whilst the nucleus either is unaffected, or its margin becomes thicker, and its substance more contracted. Liquor potassæ reduces the whole to an amorphous mass.

14. The mode in which the cancer-cell is developed offers, in the opinion of Dr. BENNETT, one of the best examples of the endogenous growth and multiplication of cell within cell. At first, numerous molecules and granules are formed in the semifluid or solid blastema, several of them coalescing to constitute a nucleus, which assumes an oval or round form. On this a cell-wall arises, and gradually enlarges, apparently formed either by the confluence of molecules attracted to the nucleus, or by the expansion of the nuclear wall. In either case, the cell-wall enlarges and separates itself from the nucleus by the endosmosis or assimilation of fluid from the surrounding blastema. Another nucleus may now often be observed arising within the cell-wall, first assuming the form of a granule, which gradually enlarges until it presents the same form and size as the former one. Double nucleated cells are very common. Within each nucleus may now also be seen one or two nucleoli, which sometimes form very early and hold the same relation to the nucleus as the nucleus does to the cell. One or both nuclei now enlarge: the nucleoli also increase in size, and not infrequently within these latter other granules may be seen, forming and enlarging in their turn. "As the included nuclei grow and become transformed into cells, the original cell-wall becomes gradually atrophied, and dissolves or breaks down into granules of disintegration; but in cases where the growth is rapid it expands, and constitutes what has been called a mother-cell, within which several cells, nuclei and nucleoli, may be seen in various stages of development. More commonly they dissolve or break down before arriving at this, and their progress is often checked by the formation between the nucleus and cell-wall of numerous fatty molecules and granules, which at length fill up the cell, press upon the nucleus, and render it abortive." This constitutes one of the modes in which the so-called compound granular cell is produced.

15. As the cell-wall becomes older, it seems to thicken, and to be less readily affected by re-agents. VOGEL says that the thick cell-wall may assume a fibrous character. Dr. BENNETT has never seen this, nor any appearance of cancer cells being developed into fibres. These cells may become caudate, elongated, and throw out pointed prolongations, but they do not split up into filaments. It is probable that fusiform or epithelial cells have been mistaken for them. Nor does Dr. BENNETT agree with Küss in supposing that the mother cells may split into smaller

segments, and so multiply by division. It is probable that cells impacted in masses of coagulated blastema have been mistaken for compound cells, owing to their close resemblance. BRUCH considers that secondary cells form within the parent one not only endogenously, but by the division of the nucleus; and supports this opinion by numerous known facts in the development of embryonal cells and of plants, in which the nucleus is seen dividing in various ways: but he denies that the cell-wall itself ever thus divides.

16. The cause of the cancer-cell varying in size, appearance, and structure, according to Dr. BENNETT, is the arrest of the process of development at different stages. It is, he supposes, with a simple cell as with the most highly organised plant or animal. It may perish at birth, infancy, youth, or maturity, while comparatively few arrive at old age. The situation and the amount of exudation or blastema thrown out also influences their number, form, and size; while the degree of pressure to which they are subjected produces a similar result.

17. Is the cancer-cell a *new substance*, or is it only a modification of cells pre-existing in the body? Dr. BENNETT states, that examined by itself, there is no possibility of distinguishing a cancer-cell from many epithelial, cartilage, or embryonal cells. "When, therefore, a cancerous growth involves a mucous membrane, the skin or bone, it may be maintained that the cells contained in it are only excessive multiplications of normal structures. When the universality of mucous membranes is considered, how they line all hollow viscera, and permeate the various glands in which cancer is common, the difficulty of disproving such a view becomes very great." In the liver also, the hepatic cells may be confounded with those of cancer in certain stages of their development; and it may be asked whether, in this situation, the morbid cells are not altered normal ones. This question, then, can only be solved by paying attention to a series of observations; and Dr. BENNETT thinks, that those which he has detailed are sufficiently numerous and varied to prove the following:—1st. That the cancerous originates in the same nervous and vascular disturbances as the other forms of exudation.—2d. That cancer-cells, in whatever tissue they may be found, whether glandular, areolar, osseous, &c. present the same characters; and—3d. That cancer may be actually seen to arise in tissues altogether separate from epithelium or cartilage. "It may be doubted whether the true cancer-cell be ever formed by transformation of a previously existing one. On the other hand, the epithelial and cartilage-cell may assume all the characters of that found in cancer, but a detection of their normal or anormal origin constitutes one of the distinctions between cancerous and cancroid growths."—(*Op. cit.* p. 149.) It is manifest from the foregoing that "Histology" throws but a faint light upon the diagnosis of the several forms of scirrhus-cancer. But it may be interesting to know what one of the ablest and most zealous histologists further states respecting other cells found in morbid and in healthy structures.

18. *B. Epithelial cells.*—The different forms of epithelial or epidermic cells, and the mode of their formation, appear to be much the same

in morbid as in healthy tissues. Dr. BENNETT states that young plastic epithelial cells, when isolated and viewed by themselves, present all the physical characters of cancer-cells, especially when they have been lying for some time in a fluid, as often observed in the air-vesicles of the lungs, in the ventricles of the brain, or in the mucous coat of the bladder. When studied, however, in mass, nothing can be more easy than to distinguish them. They have a disposition to run together in groups, and to adhere at their edges; they are of tolerably uniform size. Cancer-cells, on the other hand, never exhibit a tendency to coalesce, but are for the most part separated by a greater or less quantity of molecular and granular matter, either disintegrated, or aggregated together: they vary greatly in size. As epithelial cells become older, their dissimilarity from cancer-cells becomes greater; they are then flatter, and resemble scales. They are also more opaque, and more resistant to the action of acetic acid. When epithelial cells constitute the principal portion of a morbid growth, such as corns, warts, scaly eruptions, &c. they become greatly compressed together, those external presenting a series of superimposed laminæ, whilst the deeper are round, oval, spindle-shaped, or more or less altered in form, or sometimes united into a firm growth, by pressure. "Occasionally such growths soften and ulcerate at their summit, especially on mucous membranes, when the superficial cells imbibe moisture, enlarge, and occasionally again present many of the characters of cancer-cells.

19. *C. Cartilage-cell.*—Dr. BENNETT states, that many young cartilage-cells present the physical characters of cancer-cells, and are similarly developed, so that at an advanced stage they resemble, with their included cells and nuclei, mother cancer-cells. They may, however, be distinguished in healthy adult articular cartilage, by the hyaline solid blastema in which they are imbedded; and by the great distinctness of their margins and the high refractive power of their nuclei. Even in diseased states of articular cartilages, the cells of this structure may be distinguished from cancer-cells, by the presence of some of the former in a healthy state, although the majority of them become more or less opaque, from the deposition of molecular matter, and from the cells becoming partly or wholly filled with fatty granules.

20. The cells in *morbid cartilaginous growths* are large, and according to MÜLLER more resemble those of the embryonal, than of the adult tissues. These cells, when they become separated by disintegration of the hyaline substance, as observed in softened enchondromatous growth, pass more or less from the normal type, and resemble cancer-cells. In these cases the solid hyaline blastema breaks down into a molecular fluid, the cells are liberated, become enlarged, and float in it, together with broken up fragments of the fibrous structure, should any have existed. Water and acetic acid produce different effects upon these from those occasioned on cancer-cells.

21. *D. Fibro-plastic and Fusiform cell.*—M. LEBERT describes under this term a peculiar round or oval corpuscle, with a small nucleus, which has a tendency to elongate at both extremities, and to be transformed into fibres. Dr. BENNETT has met with these in all stages of their development, even

in cancerous and canceroid growths; but very often also in tissues and under circumstances unconnected with cancer, as in gelatinous polypus, and in the coagulated exudation from inflamed serous surfaces. From this he concludes, that fibro-plastic corpuscles are formed independently of all cancerous complication, and that cells so produced have the power, as stated by SCHWANN, of developing themselves into fibres. MÜLLER remarks that "the caudate corpuscles are by no means peculiar to fungus medullaris: they may, indeed, often be observed in its substance, but they frequently do not exist in it, while they are as often met with in non-carcinomatous as in medullary growths." He adds, that they probably depend only on the transformation of cells into fibres, and are consequently merely fibres in an early stage of development. Both LEBERT and BENNETT conclude, that the round or oval fibro-plastic cell, by elongation on one or both sides, become caudate, spindle-shaped, and at length fusiform; and that "after a time, fusiform corpuscles, by being aggregated and compressed together, may produce a fibrous texture of considerable density, and by subsequently splitting up into fibres, occasion a true filamentous or densely fibrous tissue." Dr. BENNETT adds, that the fibro-plastic cell may so resemble the young cancer and epithelial cell as not to be distinguished from either when viewed alone; but, by observing the form and character of the structures associated with it, and paying attention to the concomitant circumstances, it may in general be recognised.

22. *E. Compound granular cell.*—This cell is common in all morbid growths, and is frequently present in all the forms of cancer. It is round or oval, with a nucleus sometimes visible, at other times not. This cell varies from the 1-50th to 1-35th of a millimetre in diameter, or even still more. It sometimes contains a few granules only, at others it is so completely filled with them as to assume a brownish or dark appearance. Water produces no change in this cell, but acetic acid sometimes renders the cell-wall more transparent. Compound granular cells are soluble in ether, and break down into a molecular mass on the addition of potash and ammonia. On gradually pressing these cells by a compressor, large drops, like those of oil, sometimes appear within the cell-wall, or exude through it. The cell-wall may be ruptured by friction, and its contents dispersed.

23. The *development* of these cells has been watched by Dr. BENNETT in all forms of morbid products, and especially in the softenings occurring in nervous centres. There it may be observed that the exudation first coagulates in minute molecules and granules, among which larger, colourless, transparent bodies are soon perceived. These are nuclei, upon which a cell-wall arises. Granules, nuclei, and cells may frequently be seen in all their stages of development, coating or encrusting the vessels externally. The granules are generally formed in the cell, between the nucleus and its wall. These become more and more numerous, until at length the nucleus is observed, and the whole cell appears full and distended with them. The cell-wall is now dissolved, and its contents escape. Conjoined with this cell, masses of granules are often seen cohering together, of various shapes, and not surrounded by any membrane. These masses sometimes arise from the

solution of the cell-wall, or consist of portions of the coagulated exudation, frequently seen to break, and peel off from the vessels. The cells and masses now described are found in the exudative softening of parenchymatous organs, on the surface of granulations and pyogenic membranes, in the colostrum, accompanying pus corpuscles, and combined with cancerous, tubercular, encysted, and all other kinds of morbid growths. They were first described by GLUGE, who called them "inflammation-globules." VOGEL termed them "granular cells;" and Dr. BENNETT first called them "exudation corpuscles;" but afterwards "compound granular cells," as involving no theory.

24. The true nature of these cells has been variously viewed. They were long considered to indicate the existence of inflammation, and their presence in various kinds of exudation supported the opinion; but BENNETT states, that the recent researches of REINHARDT and VIRCHOW have shown that there is no form of cell-growth which, under certain conditions, may not exhibit numerous fatty granules in its interior, and resemble the different stages of the compound granular cell. In this manner epithelial, cartilage, hepatic, pus, cancer, and indeed every other cell, may be transformed into the compound granular cell, by exactly the same series of changes as are above described. These observers consider that the frequency of this form of cell in so many kinds of morbid growth, and in such various textures and fluids, is not so much evidence of exudation as of the fatty degeneration of all cell formations: and they further point out this fatty transformation as sometimes commencing in the nucleus, or even in the nucleolus when it is enlarged — a fact which explains many of the appearances observed in scirrho-cancerous and canceroid and other growths.

25. *F. Pus-cell.* — In the article *Pus* I have described the *Pus-cell*, according to VOGEL. *Pus* consists of numerous corpuscles floating in a clear fluid—*liquor puris*. These corpuscles are perfectly globular, and vary from 1-100th to 1-75th of a millimetre in diameter. Their surface is finely granular. They have a regular, defined edge, and roll freely in the liquor puris upon each other. The addition of water increases their size, their finely granulated surface disappears, and they become more transparent. Weak acetic acid partially, and the strong acetic acid completely dissolves the cell-wall, and brings into view the nucleus, which assumes the appearance of two or three, or even four or five granules close together, each with a central shadowed spot, and generally about 1-400th of a millimetre in diameter. Alkalies and ether completely dissolve the pus-corpuscle. Dr. BENNETT describes the production of the pus-cell as follows:—The exudation first forms a molecular and granular blastema, the individual granules of which unite together in twos and threes, and constitute a nucleus, from which a cell-wall arises. The early formation of pus may be observed in the matter squeezed out of unripe abscesses, and in the exudations from blisters and other inflamed surfaces. The cell-wall thus formed is about 1-50th of a millimetre in diameter, is highly elastic, and assumes shapes according to the degree and direction of the pressure to which it is subjected. Water and acetic acid dissolve the cell-wall, whilst the nucleus—which before the addition of these reagents, resembled an

ordinary pus-corpuscle—exhibits the usual two or three granules, which may be considered as nucleoli. Dr. BENNETT thinks that the bodies, which have hitherto been considered as pus-cells, are only the nuclei of corpuscles, the delicate walls of which are dissolved very rapidly and at an early period; but whether this is invariably the case requires to be confirmed.

26. *Pus* varies in its characters with the surface on which it is formed, and the stage and course of its formation—with its age and circumstances affecting it. When formed on a *mucous membrane*, it is often mingled with epithelial cells in various stages of development. Some "*Histologists*" have talked of mucous corpuscles; but Dr. BENNETT very justly remarks that there are no bodies peculiar to mucus, what have been described as mucous corpuscles being either epithelium or pus-cells. When formed on a *serous surface*, pus-cells are associated with filaments, and with corpuscles which differ from them in structure. These corpuscles, from the frequency of their occurrence in plastic lymph, Dr. BENNETT has called *plastic corpuscles*. VALENTIN and others have termed them *exudation corpuscles*; and M. LEBERT and Dr. WALSHE *pyoid*, from their resemblance to those of pus. They are composed of a distinct cell-wall, inclosing from three to eight granules. They vary in size from the 1-100th to 1-75th of a millimetre in diameter. The addition of water and acetic acid causes no change in them, although the latter reagent sometimes contracts and thickens the cell-wall, and at others renders it more transparent. On some occasions, when the exudation is so abundant on a serous membrane as not to coagulate, and when the fibrinous and serous portions are not fully separated, the corpuscles assume the characters of those of pus, although some of the fibrous element, with plastic corpuscles adhering to them, may still be observed. Dr. BENNETT states that *pus-cells* are occasionally found in the fluid on the surface of cancerous ulcerations; but that he has never met with them in softened cancer of internal organs but in one case, when they were at once distinguished by the action of acetic acid. This reagent, by exhibiting the peculiar granular nucleus—or nucleoli—of the pus-cell, at once distinguishes this cell from young cancer-cells (§ 14.), from young epithelial-cells (§ 18.), and from fibro-plastic cells (§ 21.).

27. iv. *FILAMENTS AND FIBRES.* — Scirrho-cancer, canceroid, and various other morbid growths have generally for their basis a fibrous structure more or less firm, which presents all the characters as to early formation and development of fibrous tissues in healthy structures. Professor BENNETT* states, that sometimes the fibrous tissue consists of delicate filaments of 1-600th of a millimetre in

* The author has much pleasure in adopting the descriptions given by Dr. BENNETT of this and other tissues, because he has satisfied himself of their accuracy. Both in this country and in Germany, from 1816 until 1820, the author was much engaged in researches, chiefly anatomical, with the aid of the microscopes then in use; but he found his eyes so seriously affected, that he gave up the pursuit until recently, when the excellence of modern instruments induced him partially to resume it, as occasions offered. He has it in his power to state, that the observations he has made, which, however, have been comparatively few, have always proved the accuracy of British observers, more especially of BENNETT, WALSHE, BOWMAN, DALRYMPLE, JOHNSON, &c.

thickness; at other times of well-formed areolar tissue, the diameter of each filament varying from 1-500th to 1-400th of a millimetre in diameter. The addition of acetic acid often renders it more transparent, and presents visible permanent elongated nuclei. Such fibrous tissue is probably formed by the juxtaposition and ultimate development of the fusiform cells described above (§ 21.). Occasionally the fibrous structure resembles elastic tissue, the filaments varying from 1-300th to 1-250th of a millimetre in diameter, and presents the characteristic curled appearance. These different kinds of filaments are sometimes so closely placed together as scarcely to be separated by the needle, at other times they are loose, widely separated, and easily torn. "They may run together, side by side, in wavy bands; be mingled together in an inextricable meshwork; or arranged in the form of loops or circles, surrounding openings or loculi."

28. Fibrous tissue is said to be formed in three ways:—1st. By the precipitation in a fluid blastema of fibrinous molecules, in the form of rows, which afterwards coalesce and become consolidated into filaments. This process has been shown in the buffy coat of the blood and in recent exudation from serous surfaces. — 2d. By the accumulation of granules, so as to form a spindle-shaped nucleus, which by its elongation splits up the coagulated exudation into laminæ and fibres, as is observed in many forms of fibrous tissue. — 3d. By the development of cells which become elongated at both ends so as to form a fusiform corpuscle, which ultimately splits up into filaments, as seen in chronic exudation on serous surfaces. All these modes of formation are seen in canceroid and other morbid growths.

29. v. CRYSTALS. — These are sometimes found in cancerous and other growths, especially if these growths have been kept any time, or are partly decomposed; or if they occur on mucous surfaces. "They then assume the prismatic and other shapes of the triple phosphate, and are the results of putrefaction. Irregularly formed crystalline masses are present in the structures, which undergo a cancerous degeneration. Crystals of cholesterine are occasionally found in the reticulum of cancer, and sometimes needle-shaped crystals of margarine." — (*Op. cit.* p. 160, 161.)

30. vi. BLOODVESSELS. — Dr. BENNETT states that he has never observed any thing peculiar about the *bloodvessels* in cancerous or canceroid growths, and that he believes them to present the same structure, and to be formed in the same manner, whatever that is, as in other tissues.

31. II. CHEMICAL COMPOSITION OF MORBID GROWTHS. — This subject has been considered by BENNETT and WALSHE, conformably with recent chemical doctrines; and for a full account of it the writings of these physicians, as well as those of LIEBIG, SIMON, DUMAS, DAY, and others, will be consulted with great advantage, although the chemical nature and relations of morbid growths are very imperfectly known. Dr. BENNETT indeed admits, that the present imperfect state of organic chemistry renders any investigation into the composition of morbid structures most unsatisfactory. All that can be determined is that morbid growths partake of the same constituent elements as other forms of exudation from the blood; and "that not only are there no means of separating chemically

the different forms of scirrhus-cancer and canceroid tumours from each other, but that it is also impossible to distinguish those from other morbid products, or even from healthy tissues. It is not by analysing large masses of morbid structure, including, as they do, granules, cells, filaments, and salts, mingled together, that any light will be thrown upon the chemistry of tumours; but rather by first separating, with the aid of the microscope, the minute structural elements entering into the composition of the growth, and then by endeavouring, by chemical manipulations under the same instrument, to ascertain the exact nature of each. Chemists have not turned their attention in this direction to any great extent; but histologists are enabled, by the use of very simple reagents, to separate the chemical principles of cancerous and canceroid growths into four groups, viz. 1st. Albuminous principles; 2d. Fatty principles; 3d. Mineral principles; and 4th. Pigmentary principles. Further than this they cannot go; but, fortunately, a knowledge of the relative amount of those is easily obtained, and yields very important information." — (*Op. cit.* p. 162.)

32. i. ALBUMINOUS PRINCIPLES. — Under this head Dr. BENNETT classes *albumen*, *fibrin*, and *caseine*, associating *gelatine* with these, although it materially differs from them. Albumen is the most abundant constituent of morbid structures. In this opinion—frequently stated in the course of this work—VOGEL, BRUCH, and BENNETT agree, whilst they also admit, that the more solid parts are fibrin, and that the fluid in which the corpuscles swim is albuminous, the one being necessary to form the filaments, the other the cells. Fibrin may thus be considered as being formed from albumen; for ZIMMERMANN has shown that fibrin results from a change in albumen, and has referred to the experiments of TIEDEMANN and GMELIN on the chyme, chyle, and blood of herbivorous animals, compared with those of carnivorous animals, which show that, notwithstanding the nature of their food, the chyme of the latter contains no fibrin, and their blood less fibrin, than the blood of the former; the fibrinous principle of the food of the carnivora being reduced to albumen during the primary digestion. The experiments of MAGENDIE, NASSE, and others, have shown that blood deprived of fibrin transfused into an animal, contained fibrin and became coagulable after having circulated for some time. From these facts it is manifest, that the fibrin of the blood is developed chiefly during circulation. On this subject Dr. BENNETT remarks, that "it seems extraordinary, if the muscular and fibrous tissues are formed from fibrin, that this principle should exist in normal blood only in the small proportion of from one to three parts in one thousand—a quantity wholly inadequate for the purpose."

33. But it should be recollected that the nutrition of muscular and fibrinous tissues is not merely an attraction of fully developed fibrin, but of the constituents or elements of fibrin, which are changed into, or incorporated with, fibrous structures by the influence of vitality; the fibrin existing in healthy blood being merely the residuum of the conversion of these elements. This view of the subject is supported by what is actually observed in diseases which impede the nutrition of fibrous structures, as in acute rheumatism, pneumonia, consumption, inflammatory fevers, &c. in

which the quantity of fibrin in the blood is excessive; for in these diseases the nutrition of these structures is either impeded or arrested, and hence the accumulation in the circulation of the elements forming them favours the development of fibrin in the blood, when vital power is not so far reduced as to prevent the attraction and cohesion of the constituents necessary to the production of fibrin. According to this view the increase of fibrin in the blood is a consequence of inflammatory diseases; the non-incorporation of the constituents of fibrin by fibrinous tissues — or the interrupted nutrition of these tissues — causing an excess of these constituents, and the attraction and cohesion of a certain proportion of them, according to the state of organic nervous energy, in the form of fibrin, during the process of coagulation, when the blood is removed from the system.

34. The existence of *casein* in scirrhus-cancer, and in other morbid growths, is very doubtful, although its presence has been contended for by several chemical pathologists, in tuberculous and some other diseased structures. MÜLLER proved the presence of *gelatin* in enchondromatous and colloid formations. Dr. BENNETT states some preparations of colloid in his possession are still perfectly transparent after long immersion in alcohol; whilst others have been transformed into a white opaque matter, resembling boiled white of egg. Hence the chemical composition of this viscus fluid in cancer may be inferred to differ in different cases; but in what this difference consists, unless it be owing to the quantity of albumen it contains, has not been determined. The able investigator just mentioned remarks that, in a fluid state, the albuminous principles are, with the exception of caseine, not affected by the addition of acetic acid; but when once coagulated in the form of molecule, fibre, or membrane, they are again rendered more transparent by this agent. This property of acetic acid enables the histologist to render their sections and filaments of structures transparent, and to partly dissolve cell-walls. The filaments and cell-walls of scirrhus-cancerous and canceroid growths are composed of albuminous principles, and the more filamentous and dense the structure is, the more does it abound in this chemical constituent.

35. ii. FATTY PRINCIPLES. — The modes in which fatty matters may be produced in the system, in health and in disease, have been much and differently discussed amongst chemists and chemical pathologists — a class or sect of pathologists which have again risen to celebrity, with LIEBIG at their head. Fatty matter exists in scirrhus-cancer and other morbid growths in four states — as a nearly pure fat, in an almost saponified state, in a non-saponified state, and as a fatty acid. Dr. BENNETT states that it is never structurally free, for, being invariably associated with fluid albumen, no sooner is oil precipitated so as to assume form, than the minutest granule of it becomes enclosed in a thin coagulated film of albumen. Such granules may be recognised by the resistance they offer to the action of weak acetic acid, or by their disappearance on the addition of ether; and their number, in any given point of a structure, is a tolerable index of the amount of fatty matter present. Fat may also exist in the form of crystals of cholesterine, and of margaric acid. The French chemists insist that

fat enters the body ready made in the food; whilst LIEBIG and his disciples maintain that it is formed in the system, 1st, by the *primary digestion*, and 2d, by the decomposition of the tissues or by *secondary digestion*. It is probable that, in morbid structures, its presence may also be sometimes imputed to a transformation of the albuminous constituents, or of a portion of them.

36. The existence of fat in healthy and in morbid structures may, therefore, be more correctly referred to the following different sources: — 1st. To the introduction of ready formed fat in the food; — 2d. To the early processes of digestion; — 3d. To the decomposition and absorption of the tissues; — and 4th. To the transformation of the albuminous principles. The *first* of these sources requires no remark. As regards the *second*, it cannot be doubted that animals which become very fat by feeding on grain, must have the power of converting the constituents of these into adipose tissue, as the very small proportion of oil which these contain could not be adequate to this result. The *third* source may be less readily admitted, although various considerations suggest its existence. As to the *fourth* source of fatty production, it certainly exists in morbid formations, and especially in albuminous exudations, more generally than is supposed. I have seen it repeatedly to a very great extent in the albuminous exudations formed between inflamed serous surfaces, more especially in the chronically inflamed cases; and when the albuminous exudations had passed to the state of organised, or partially organised, areolar tissue, this adventitious tissue appearing not only to contain oil-globules thickly disseminated throughout it, but, in some instances of long standing, gradually to pass into masses of fat, identical with other adipose parts. These changes in the adventitious membranes, adhesions, and parts connecting inflamed serous surfaces have been already noticed when treating of the alterations consequent upon inflammations of the *peritoneum* and *pleura*; but they have hitherto escaped the notice of pathologists. I have also observed this conversion of old exudations from, and adhesions between, serous surfaces into fat within the vertebral theca, in cases of prolonged paraplegia; and very probably this conversion is one of the modes of reparation, or of removing these consequences of inflammatory action, the albuminous principles passing into the fatty to facilitate their absorption through fine vessels or canals.

37. Connected with this subject, Dr. BENNETT remarks that it is probable, under favourable circumstances, that the albuminous principles may be converted into fat; for pathologists are acquainted with numerous facts, which prove that muscular, areolar, fibrous and other albuminous tissues may be so converted. The universal occurrence of compound granular corpuscles in old exudations is evidence of this, although it may be erroneous to suppose that the original transformation is connected with any influence possessed by cells. DONNÉ, after carefully removing all the globules from milk, and leaving no visible evidence of fat under highly magnifying powers, still succeeded in extracting it by means of ether. "Fat; then, is probably held in solution, and enters the cell-wall by endosmosis; where it is precipitated in the form of granules, which become enveloped

with a layer of albumen, and are prevented from passing out. In this manner fat, resulting from the disintegration of exudations, becomes accumulated in previously existing cells. Hence various kinds of these bodies act as mere store-houses for excessive formations of fat in morbid growths, as the adipose cells proper perform the same function in healthy tissues. In one, fat exists in the form of granules, in the other as a fluid oil, because pre-existing cells generally have for their contents albuminous matter in a state of solution, which is not the case with the adipose cells."—(*Op. cit.* p. 166.)

38. When the muscular system undergoes the fatty degeneration, it has been supposed that the deposition of fat by its excess causes atrophy, and subsequently destruction of the muscular fibres. But Dr. BENNETT states that, in watching carefully the progress of fatty transformation, he has convinced himself that it often commences in the very centre of the muscular fasciculus, apparently by the fibrillæ breaking up, losing their continuous and characteristic transverse markings, and assuming the form of minute fatty molecules, which afterwards become larger and larger, so as to constitute granules of various sizes. The same change is observed in muscles in the vicinity of diseased parts which for a long time have not been called into action. This observer adds, that "the whole fasciculus becomes thus affected, and at length large drops of oil accumulate in the interstices of the fasciculi, which gradually assume all the appearances of adipose cells, and, by their increase at the expense of the muscular fibre, communicate to it the yellow colour and other physical characters of fat. This conversion of the albuminous principle into the fatty, is brought about independently of the agency of cells or nuclei, and shows that, in the retrograde, as in the advancing process of nutrition, the molecular and granular element is the form of structure which is the basis of every other."

39. iii. MINERAL PRINCIPLES. — In scirrhus, cancerous, and various other morbid growths, as in every other exudation from the blood, more or less of mineral or saline matter is present, the amount however of which varies much in different cases. These form into crystals with the progress of decomposition, crystals of the ammoniaco-magnesian phosphate being not uncommon. More generally small collections of phosphate of lime are found either in granules or in masses, or in irregular fragments, which are soluble in the nitric and hydrochloric acids. Sometimes the mineral substance is so abundant as to impart to the dried growth an osseous appearance. This change may take place in cancerous as in tubercular formations, although not so frequently, converting portions of either into calcareous concretions. Dr. BENNETT states, that in some forms of cancrioid growth, the mineral principle, like the fatty, seems to enter pre-existing cells in a state of solution, and to become afterwards precipitated, so as to assume somewhat of an organized appearance.

40. iv. PIGMENTARY PRINCIPLES. — The exudation of blood into the substance of scirrhus, cancrioid, and other morbid structures, and the change in the exuded blood, as well as the alteration thereby occasioned in the tissues in which the blood exudes, are manifestly the causes

of the different tints of colour which these structures present. The deeper hues are probably owing to some chemical change in the exuded blood and other fluids, and probably the colouring matter of bile may sometimes aid in modifying or deepening the tint. Dr. WALSHE considers the bright yellow matter, associated with fatty matter, sometimes forming a reticulum, or collected together in masses, to be analogous to the kironosis of LOBSTEIN; but LEBERT views it as a peculiar kind of fat, which he calls xanthose. The black matter sometimes found in cancer, is owing either to the action of the morbid secretion of the diseased part upon the globules of the blood in the capillaries or exuded from them, or to the association of melanosis with cancer (see art. MELANOSIS, §§ 4. *et seq.*). That it originates in some change which the blood undergoes, is shown by the circumstance of this change having been traced in the same specimen through all the intermediate tints from blood-red and rusty brown to the deepest black. Dr. BENNETT has ascertained that the colour of the black matter, occasionally found in cancerous growths, is destroyed by nitric acid and chlorine,—a change which distinguishes it from the black matter which commonly accumulates in the bronchial glands and lungs of old people, and in the black phthisis of colliers. In the latter instance the black matter is undoubtedly carbon, in the former its nature is unknown.* — (See arts. LUNGS, § 185.; and MELANOSIS.)

41. III. GENERAL ANATOMY OF SCIRRHO-CANCEROUS AND OTHER GROWTHS. — i. OF SCIRRHO-CANCEROUS GROWTHS. — Continuing to adopt the description of Professor BENNETT; these growths are constituted of nucleated cells, presenting the characters attributed above to cancer-cells (§§ 13. *et seq.*), and infiltrated among the meshes of a fibrous stroma. Conjoined with the fibres and cells there is invariably present a viscous fluid, in which the cells swim, as seen under the microscope. The fibres, the cells, and the viscous fluid, are the three essential elements of these growths; and it is on the relative amount of each which determines the species of cancer. "If the fibrous element be in excess, it constitutes *scirrhus*, or hard cancer; if the cells be numerous, *encepha-*

* According to SIMON and DAY, the following *proximate analysis* of scirrhus have been made by M. L'HERETIER:—

	Of Breast.	Of Uterus.	Of Dorsal Region.
Water	29.75	21.15	24.80
Albumen	28.10	29.85	21.70
Fibrin	18.80	15.20	27.15
Gelatin	7.60	-	8.17
Fat	2.00	-	8.05
Phosphorized fat	-	6.00	-
Proxide of iron	1.15	1.25	traces
Yellow pigment	-	7.00	-
Salts	12.60	9.55	10.13

A fatty growth analysed by NEES VON ESENBECK contained 23.0 of solid fat; 12.0 of extract of flesh; 11.0 of gum-like animal matter; 23.0 of albumen; 19.0 of phosphate of lime; and 1.5 of carbonate of magnesia. It is not stated whether this solid fat contained cholesterine; in all probability it did, as this substance is often found in fatty tumours. In a fatty tumour examined by MÜLLER, acicular crystals were found mixed with a grey substance which was deposited in vesicles and dissolved by boiling water, from which it was not precipitated by acids or the ordinary metallic salts. The crystals were insoluble in acids, water, or alcohol, but dissolved in ether; hence they probably consisted of cholesterine. Another fatty tumour contained some casein, precipitable from the aqueous solution by acetic acid.

loma or soft cancer; and if the fluid abound, or be collected into loculi or little cysts, it is *colloid* cancer. All these forms of cancer may frequently be observed in the same tumour—in one place hard or scirrhus; in another soft or encephaloid; and in a third jelly-like collections, or colloid. Yet, although they may pass into or succeed one another, they are not infrequently distinct from their origin to their termination."

42. *A. Scirrhus*.—Hard cancer has been fully described in the article *CANCER*; and I have therefore only to add at this place, that at all times a pulpy substance may be removed from a fresh-cut surface of it by scraping, which, on microscopic examination, is seen to contain numerous cancer-cells, mingled with molecules, granules, and fragments of fibrous tissue,—an appearance which distinguishes scirrhus from certain forms of fibrous tumour, which to the naked eye exactly resemble it. A thin section of the scirrhus growth is seen to be principally composed of filaments, of various sizes, running in different directions, sometimes forming waved bands, at others an inextricable plexus, among which the cells may be seen infiltrated, or forming loculi or cysts enclosing masses of these cells.

43. *B. Encephaloma*.—Soft, or brain-like cancer, has been considered in the article *FUNGOID DISEASE*. It consists of a soft pulpy growth, of a whitish, yellowish, or bluish tint, breaks down on moderate pressure, and yields a copious milky or creamy juice. It presents different degrees of vascularity; reddish parts or spots appearing, owing to extravasations of blood, or to degrees of vascularity. On examining a fresh-cut section, it presents a very loose fibrous texture; but in the denser parts it approaches the character of the soft portions of scirrhus. In the pulpy parts no trace of fibres is visible, or merely fragments of them. Yellowish parts, either reticulated or collected into masses, generally consist of fatty degeneration of the cancerous tissue, and form the cancer reticulare of MÜLLER. This yellow matter is often of cheese-like consistence, friable, and resembles tubercle, for which it has been mistaken. The blackish tinge is owing to black pigment (§ 40.) infiltrated in the cancerous elements, or existing within the cells, constituting the malignant melanosis, or melanic cancer of some authors. The cream-like fluid presents, under the microscope, a number of the cancer-cells already described (§§ 13. *et seq.*). Sometimes mingled with a large number of molecules, granules, compound granular cells, blood-corpuscles, and more or less of the fibrous element. (See art. *FUNGOID DISEASE*.)

44. *C. Colloid or Gum-Cancer*.—Glue-cancer, or collections of gelatinous matter resembling glue, calves' foot jelly, or semi-fluid gum, are found in masses varying from a minute point to the size of a large orange. In colour colloid is yellowish, greyish, brownish, or reddish; very rarely green or black. It may be transparent or amber-like, or semi-transparent or opaque, resembling honey. It may be disseminated in a fibrous texture, giving it a pearly aspect, or it may be collected in distinct cysts. "It is one of the most common constituents of compound encysted growths of the ovary, and it is not infrequently seen in cysts of the kidney, and follicular swellings of the skin."—(BENNETT.) On examination with the microscope, this substance

is occasionally seen quite structureless, or exhibits only a fine molecular appearance, and it then has been called *colloid tissue*. At other times numerous nucleated cells, presenting all the characters of cancer-cells, in various stages of development, are found in it as a blastema; and it is then observed that the growth has a tendency to spread. This is *colloid cancer*.

45. "When colloid cancer is formed on a free surface, as on the peritoneum, it often presents small grains, of a grey colour, resembling coagulated gum-arabic. When collected in masses, these have an irregular nodulated aspect. A fresh section presents a surface with numerous loculi or cysts, which vary from the size of a pin's head to that of a walnut, filled with a clear glistening gelatinous matter, surrounded by fibrous substances or mesh-work." Cancer-cells originate in colloid matter, as in other kinds of blastema, by the formation of granules, nuclei and cells. The fibrous structure of colloid, according to Dr. BENNETT, never contains permanent nuclei, or affords any evidence of being developed from nuclei or cells; it seems rather to be formed by precipitation alone.

46. *D. These three forms of true cancer are vascular, but in different degrees. Scirrhus is least so; colloid is more so than scirrhus; and encephaloma is most vascular—sometimes so much so as to bleed readily and profusely. These forms pass into each other, sometimes so imperceptibly as to render the arrangement of several specimens a difficult matter; more especially as respects scirrhus and encephaloma or fungoid cancer.*

47. ii. *OTHER MORBID GROWTHS*.—Morbid structures, which, to the unaided sight, to the touch, and often in the progress of the case, so closely resembles cancer as to be frequently mistaken for it, and yet which presents on microscopic examination differences of a very marked character, have been termed *cancroid* by Dr. BENNETT. Hitherto, he remarks, this distinction has not been very accurately attended to; for, although practitioners have recognised the existence of fibrous, sarcomatous, warty, fatty, and other so-called non-malignant growths, experience every day proves that there are no symptoms which enable them to detect these with certainty.

48. *A. A fibro-nucleated cancroid growth* is described by this writer to consist of filaments infiltrated with oval nuclei. It can be distinguished from scirrhus and from encephaloma only by microscopic examination, as it sometimes closely resembles the one, and at other times the other. As to its minute structure this growth ought to be separated from true cancer on the one hand, and from fibrous tumours on the other. It is deficient in cancer-cells, which are essential to the first; and it possesses numerous naked nuclei in no way connected with cell-formation, which are not found in the second. This form of *cancroid* growth, however, evidently so closely resembles cancer, or possesses so much of what has been usually called the malignant character, in other respects, that a diagnosis is difficult. The most important distinction between it and true cancer is that, although it may return in the place originally affected, after excision, it does not appear ever to occur secondarily in the glands or other organs.

49. *B. Epithelial Cancroid Growths*.—Dr.

BENNETT considers that cancer of the lip, chimney-sweeper's cancer, *noli me tangere*, malignant ulcer of the face, cauliflower excrescence of the uterus, and other appellations are given to morbid growths, which have been considered cancerous or malignant, but which possess a very different structure, and are therefore only canceroid. Mr. PAGET pointed out the identity of several of these, considered them as warty in their nature, and ascribed them to hypertrophy of the papillæ of the skin. Dr. SIMPSON classed cauliform excrescence of the cervix uteri with soft warts and condylomata, and stated that it had often been confounded with carcinoma or medullary fungus. Examined by REID and GOODSIR it was shown to consist of groups of large nucleated cells. These and similar alterations of the epidermic and mucous surface Dr. BENNETT views as epithelial canceroid growths, and as essentially consisting of an hypertrophy of the mucous or epidermic layer, composed of numerous epithelial cells more or less impacted together (§ 18.). They may occur on large free surfaces, as the skin or digestive mucous membrane; or within mucous follicles, and the minute ramifications of secreting glands, as the mammæ, kidney, &c. In the former case, corns, callosities, condylomata, warts, and scaly eruptions of the skin, or polypi and fungous excrescences of the mucous membrane are occasioned. In the latter case, various kinds of encysted swellings, hairy and horny productions, and dilatation of the minute ducts in secreting glands by the desquamation and retention of their contained epithelial cells are produced. The forms of epithelial growth which more especially resemble cancer, and which are therefore canceroid, are — 1st. Certain warty and fungoid excrescences of the skin and mucous surfaces; — 2d. Some ulcerations of mucous membranes, especially those of the lip, tongue, and cervix uteri; — and 3d. The changes occurring in follicles and excretory ducts, the latter, when associated with hypertrophy of the surrounding fibrous tissue, constituting some forms of so-called sarcomatous tumours.

50. (a.) *Warty and fungous excrescences* are very common. The former are often observed on the fingers of young persons, more especially of those addicted to the vice of self-pollution; and they sometimes also appear about the face and neck. They consist of a congeries of elongated papillæ, sometimes flattened at the top, at other times presenting fissures and sulci leading to a common root. These tumours may vary from the size of a millet seed to that of a child's head. Dr. BENNETT describes them as having their surface sometimes smooth, at other times lobulated, composed of rounded groups of papillæ resembling a cauliflower. When small, they are almost wholly composed of epithelial scales, which assume a square or elongated form, their nuclei being usually very distinct. The larger growths internally consist of a fibrous structure, into which loops of vessels from the capillary network of the dermis is prolonged. They are covered by compressed epithelial scales. They often soften and ulcerate on their surface or at their base, some of the epithelial cells then enlarging from endosmoses and often resembling cancer-cells, whilst others are elongated and split into fibres. Mingled with the altered cells are numerous molecules and granules, and often pus-corpuscles,

giving an ichorous character to the discharge from the sore or ulcerated surface. In this manner a canceroid ulceration may be produced, and proceed to a greater or less extent, the base of the ulcers being generally covered by papillated fungoid projections, the edge being elevated, indurated, and rugged.

51. The *polypi* which grow from the surface of mucous membranes are covered externally by thickened epithelial cells, are internally composed of fibrous tissue more or less dense, and are abundantly supplied with blood-vessels. They resemble in structure the excrescences just described, and like them may ulcerate, the ulceration, however, being much more frequently attended by hæmorrhage. These polypi are very common in the cervix and os uteri, and less so in other mucous surfaces.

52. (b.) Another form of *epithelial canceroid* is described microscopically by Dr. BENNETT as appearing first as an ulcer, sometimes as a slight induration of, or small wart on, the affected part. It is common on the under lip, on the tongue, and in the cervix uteri. In the lip, a furrow or groove is often observed early in the indurated spot. This slowly extends, in the form of ulceration, with indurated, thickened, and raised margins, is circular and cup-shaped, its surface being sometimes covered by a white-cheesy matter, at others by a thick crust; and proceeds until it involves a considerable portion of the structure, pouring out a foul ichorous discharge. In the tongue the base of the sore is fungoid and papillated, and dense, owing to the close impaction of laminæ of epithelium. On the cervix uteri, these ulcers have hard, irregular edges, yield a copious ichorous discharge, and cause more or less thickening of the adjoining textures. When examined microscopically, these canceroid ulcers present on their surfaces masses of epithelial cells, in all their stages. Some of these cells are spherical, nucleated, about 1-50th of a millimetre in diameter; others much larger. They often resemble cancer-cells when viewed alone, but are associated with flattened scales, varying in size and shape, sometimes in groups adhering at their edges, at others forming confused masses. Many of the cells and scales often reach an enormous size, and as they become old split into fibres. These elements are commonly associated with numerous molecules and granules, naked nuclei, fibro-plastic, fusiform and pus-cells. Immediately below the surface, the epithelial cells are more or less compressed and condensed; and, when the disease is very old, they present concentric laminæ, surrounding a hollow space.

53. (c.) *Cystic Growths*, consisting of epithelial cells and scales, often occur in minute follicles and crypts. They may also form within the excretory ducts of glands. They have been well-described by M. LEBERT and by Dr. BENNETT. The contents of these cystic growths are not merely epithelium-cells in all stages of development, but also fatty cells, granules, and crystals of cholesterine. These obstruct the duct, and then enlargement or tumour of a cystic kind is formed. These cysts vary from the size of a pea to that of a large orange; their appearance varying with the proportion of epithelium, or of fat, or of cholesterine they may contain. Quantities of epithelium are also thrown off from the lining of the

lateral ventricles in cases of cerebral meningitis, and in the ovaria during ovarium dropsy.

54. "In many fibrous, or so-called sarcomatous growths in glands, we frequently find the hypertrophied filamentous tissue forming loculi which vary in shape with the amount of lateral pressure they receive. This may occur in cancerous and canceroid growths, and the spaces so produced may be occupied by either cancer or epithelial cells. Hence, even on a microscopic examination, the latter may be readily mistaken by an experienced histologist for cancer. The fibrous tissue in both cases is the same, but the cells present the differences formerly pointed out between cancer and epithelial cells (§ 18.), the latter being frequently about the same size, and exhibiting a great disposition to run together in groups." The cystic formations in sarcoma are caused by the same circumstances as produce simple cysts in the liver, kidney, and other glandular organs: the minute excretory ducts are obstructed by granular exudations or exfoliations, and fluids accumulating behind them produce dilatations or cysts. Hence the frequency of encysted growths in structures furnished with follicles or ducts. Occasionally the epithelium is so closely impacted in the dilated ducts as to be turned out in the form of moulds of the tubes on making a section through them. "This form of epithelial accumulation in the ducts of glands, which are the seats of fibrous or sarcomatous growths, merits great attention, as to this circumstance must be attributed their great resemblance to cancer." — (p. 183.)

55. *C. Fibrous canceroid growths* consist wholly of fibrous or filamentous tissue, and so closely resemble scirrhus as to be continually mistaken for it. This fibrous tissue is formed as above described (§§ 27, 28.), and it may be thus produced in various tissues and organs. This tissue is the most universal both in healthy and diseased parts. It forms the stroma, or frame-work, of nearly all the tissues. "It exists in almost every kind of canceroid and cancerous growth: so that a fibrous tumour is one of these, minus the nuclei and cells, which give to each its peculiarities. Fibrous growths present themselves in numerous forms. One of the most common is that of *cicatrix*; another is that of a white glistening patch, so common on serous surfaces; a third is the chronic band or ligamentous tissue uniting serous membranes, the result of simple exudations of some standing; and a fourth is the peculiar induration of the skin, constituting sclerosis in children, and elephantiasis in adults." — (p. 184.) Canceroid fibrous growths assume two principal forms, — 1st. Thickening or hypertrophy of the sub-areolar tissue of mucous membranes; — 2d. Tumours of different varieties.

56. *a. Thickenings and indurations* of the sub-mucous areolar tissue cause strictures of canals, as in the alimentary canal, urethra, &c. They may follow any protracted irritation causing exudation. Chronic irritation of the stomach, or gastritis, may induce a similar lesion, with hypertrophy of the muscular coats, so as closely to resemble scirrhus; and many cases of stricture of the intestines have a similar resemblance; and yet upon a close examination they contain nothing but the elements of fibrous tissue — are merely simply fibrous. This form of morbid growth

consists almost entirely of dense bands of filaments of a glistening or dull white colour. Here and there, naked nuclei varying in size, or fibro-plastic corpuscles, mingled with fusiform bodies, may often be detected between these fibres.

57. *β. Fibrous canceroid tumours* comprise, besides those which are strictly fibrous, those which have been usually called sarcomatous and neuro-matous. Dr. BENNETT considers them all "to consist of a fibrous structure in different stages of development, the softer and more vascular forms being such, even when their elements have not yet completely passed into the perfect fibrous state. For this reason they have been made to constitute a distinct group by LEBERT, under the name of fibro-plastic tumours. Such growths may always be seen passing into true fibrous tissues. In some, whilst one part may be called sarcomatous or fleshy, another is truly fibrous. Other kinds of fibrous tumour resemble tough ligament and fibro-cartilage, presenting all kinds of intermediate degrees of conversion between the areolar and elastic tissues. Fibrous tumours may therefore be divided into — 1st. Sarcomatous; — 2d. Desmoid; — 3d. Chondroid; — and 4th. Neuro-matous fibrous tumours." — (p. 185.)

58. *1st. Sarcomatous tumours* are either spherical or more or less lobulated. The first are of the consistence of muscular tissue or soft cartilage. Their surfaces, when divided, are smooth or finely granular, and their colour varies from a whitish yellow to pink or deep red, with the amount of vascularity. Sometimes on section, the surface is mottled from an intermixture of these tints, or ecchymosed. The vascularity of these tumours disposes them to ulceration and to the breaking down of their substance with the formation of a purulent fluid. They are generally encysted, originate in cellular tissue, and are found in fibrous and osseous structures. In the last-named situation they have been called osteo-sarcoma, a name which has been sometimes given to cancerous disease in this situation. LEBERT considers fungus of the dura mater to be sarcomatous. These tumours increase in size slowly, causing injury by their pressure on adjoining parts, not only impairing function but producing absorption and ulceration of the parts pressed upon. In a gentleman whom I attended for gradually increasing hemiplegia, passing slowly into general palsy and coma, one of these tumours existed in the upper jaw and another in the pericranium; and I stated that the palsy was most probably owing to a similar formation in the dura mater. On examination after death, this was found to be the case. A large tumour on one side having caused the hemiplegia, a small one being also present on the other side, and having produced the palsy of the other side also, shortly preceding dissolution. (See art. BRAIN and MEMBRANES, §§ 8, 9.)

59. Sometimes these tumours are more soft and lobulated, and are then readily mistaken for encephaloma. The lobules vary greatly in size, have externally a papillary or cauliflower appearance. They frequently resemble the pancreas, and were hence called pancreatic by ABERNETHY. The lobules are surrounded by a layer of more or less dense areolar tissue; and are of a greyish, yellowish, or rosy colour, according to their vascularity.

60. These tumours are found in many places.

below the skin copiously supplied with cellular and fibrous tissue. They are not infrequent in the mammæ; and in this situation they are distinguished from scirrhus with the greatest difficulty. M. LEBERT describes small mushroom-like growths on the conjunctiva which are sarcomatous, and which may destroy the eye by their size and pressure. Dr. BENNETT has found many granulations on the valves of the heart to consist of a sarcomatous and fibrous structure.

61. "The minute structure of these tumours is essentially fibrous, but many of the fibres are seen to be made up of congeries of fusiform cells closely applied together. These cells are of a spindle-shape, varying in length and breadth, and for the most part distinctly nucleated. Many of them may be seen branched at their extremities and passing into fibres, according to the mode of development of fibrous tissue described by SCHWANN. In some the nucleus will be found to have disappeared. Other of the cells will be found round or oval, or only slightly elongated; these are younger growths. In the same tumour all these different stages may be observed. In the softer parts, isolated cells and nuclei abound; whereas in the harder and denser parts, the development into fibrous tissue will be found more perfect."—(p. 187.) Some of the softer forms of sarcomatous growths contain cysts, and in these groups of transparent cells are observed, which present on the addition of acetic acid distinct round nuclei, about one-third the size of the cell. These cells closely resemble epithelial cells. The fibrous structure sometimes forms loculi, which may be crowded with these cells, so that in these cases fibrous and epithelial growths are conjoined.

62. 2d. *Desmoid fibrous tumours* are generally of a white or whitish yellow colour, tough and elastic, resembling the structure of the dermis. They are of a rounded or oval form, often imbedded in a cyst, consisting of the structures in which they lie. They vary in density from that of tendon to that of fibro-cartilage. On section they present numerous white glistening fibres intimately interwoven, or arranged in bundles, forming circles or loops interlacing with each other. They sometimes have a bony centre or nucleus. They are not very vascular. They vary in size from that of a pin's head to several feet in circumference. Dr. BENNETT possesses one four feet in circumference, and he refers to one still larger. They may occur in various tissues and organs—in the sub-cutaneous cellular tissue, in the sub-mucous tissue, and in the mammæ and uterus, where they are common. In the last situation, they often push the mucous membrane before them, and in this way grow outwards, forming one of the so-called polypi uteri. In other cases, they grow towards the serous or peritoneal cavity, pushing the membrane before them, and thereby forming a neck by which they are attached to the uterus, as if growing from it. The pedicle thus formed may break off, and the tumour thus become free in the peritoneal cavity. In the same way these tumours may become detached in the joints—loose fibro-cartilages; and even in the veins—when they have been named *phlebolites*. The minute structure of these tumours is chiefly filamentous, the fibrilles varying from 1-700th to 1-800th of a millimetre in diameter. Their softer portions may be separated by a fine needle, but

this is impossible in the denser parts. Sometimes the filaments are more or less waved; at others, they are curled and brittle, as in elastic tissue. Occasionally fusiform nucleated cells are found, indicating that these fibres are probably formed from cells. Sometimes isolated nuclei and corpuscles are also found, as in sarcomatous tumours, but the proportion of them is very small. The bony centres of these tumours are sometimes cartilaginous, at others composed of amorphous mineral matter, more rarely of true bone, two instances of which latter were seen by M. LEBERT.

63. 3d. *Chondroid fibrous tissues* were first accurately described by MÜLLER, and shown by him not only to resemble cartilage, but also to possess much gelatine in their composition. They vary in shape. When divided they present a smooth, milk-white, glistening surface, like fibro-cartilage. Their thin substance is very dense, separated with great difficulty by needles, but easily cut into thin layers. It crunches under the knife, and is very little vascular. Its intimate structure consists of fibrous tissue, resembling the fibro-cartilage of the ear, or the intervertebral substance.

64. The preceding kinds of fibrous structure may be associated in one tumour. Some are composed of several rounded or oval masses, varying in size, and surrounded, and separated from each other by a cyst, or layer of areolar tissue. The external surface, under such circumstances, is more or less nodulated. Some of these are occasionally soft and pulpy—semi-gelatinous, with a very sparing layer of fibrous tissue, whilst others are more or less tough, gradually passing into a fibro-cartilaginous density, and grating under the knife. Dr. BENNETT has observed, even of one nodule, parts soft and others hard, the former being cellular, the latter fibrous, every degree of variation existing between them.

65. 4th. *Neuromatous fibrous tumours* are formed in the nerves sometimes spontaneously, at others consecutively of injuries, especially of amputation. In the museum of the Richmond Hospital, Dublin, a series of these tumours are preserved, most of them taken from a person in whom almost every nerve presented knotty swellings, some of them varying from the size of a nut to that of a child's head. Dr. BENNETT examined them microscopically. Having been long kept in spirit, he could only determine the existence of fibrous bands running in various directions, mingled here and there with compound granular masses. In some fresh neuromatous tumours which he examined, it was demonstrated, "that in addition to bands of fibres running in waved lines, and sometimes forming loops, there were occasionally transparent cells, with a nucleus composed of two or more small granules, not affected by the addition of acetic acid."—(p. 190.)

66. D. *Cartilaginous canceroid growths* were first separated from cancerous and osteo-sarcomatous tumours by MÜLLER, who called them *enchondroma*. "When found in soft parts, or merely attached to bones, they are surrounded by an envelope of condensed areolar tissue, when in the bones by a bony capsule. In the first case they occur, although very rarely, in the glands, as in the parotid or mamma. In the second case, they are most common in the bones of the extremities. When formed in the substance of long bones, they

present rounded, smooth tumours; when in the periosteum or flat bones, their surface is rough and nodulated." The structure of enchondroma is the same as that of cartilage; it presents transparent nucleated cells, varying in size, isolated or in groups, situated in a hyaline substance. A network of filamentous tissue runs through the substance of the tumour, forming areolæ in which blood vessels ramify. The cartilaginous and areolar tissues vary in amount in different tumours. Sometimes the cartilage is in excess; and it then resembles that of young animals, the cells being unusually large. When the fibrous element abounds, then the whole mass is identical with fibro-cartilage, as in sarcomatous tumours (§§ 58—61.). Between these extremes there are infinite varieties, many of which may often be seen in one tumour. Occasionally a bony nucleus is found in a nodule of enchondroma, and sometimes these nodules present all the stages of transformation into bone.

67. Notwithstanding these peculiarities of structure, these tumours are often mistaken for osteo-sarcomatous or cancerous growths, chiefly owing to their occasional softening, and to their presenting, in such circumstances, the external characters of encephaloma. The softened portion, even under the microscope, may, without great care, lead to error, as the cartilage cells which float loose, mixed with granules and debris of the tumour, closely resemble those in cancerous growths.

68. *E. Fatty canceroid growths*, in the form of tumour, when mingled with fibres and other elements, may be mistaken at first sight for scirrhus. "Fatty tumours vary in size, but they may reach a growth weighing 30lbs. Sometimes their surface is smooth, at others lobulated. They are of a yellow colour, resembling adipose tissue; sometimes divided into bands by white fibrous tissue. The relative amount of these two elements varies greatly in different specimens; some being soft, oily, containing few fibres; others being harder, dense, the areolar tissue preponderating. For the most part they are very sparingly supplied with blood vessels, but these abound more in the fibrous varieties. In the latter case they are liable to ulcerate, and, under such circumstances, have frequently been mistaken for cancer. Some of these tumours, indeed, may be considered as fibrous or sarcomatous, combined with an unusual quantity of fat. Occasionally they are connected with the ordinary adipose tissue of the body. They are often surrounded by a delicate cyst or envelope; sometimes this is not perceptible. When the collection of fat resembles the ordinary adipose tissue, the tumour has received the name of *lipoma*. When it is more lardaceous, some have applied to it the term *steatoma*, in the same manner as when the substance is encysted."—(*Op. cit.* p. 193.)

69. The minute structure of these tumours varies with the amount of adipose or of fibrous tissue. The former is composed of vesicles of a round or oval form, altered more or less in shape by pressure. The vesicles vary from 1-20th to 1-50th of a millimetre in diameter. They are composed of a diaphanous cell-wall, frequently including a nucleus. The nucleus is round or oval, about the 1-100th or 1-200th of a millimetre in diameter. Occasionally it appears stellate, of

a crystalline aspect, from the formation of crystals of margarine or margaric acid around it. On rupture of the cell-wall the oil may be made to flow out, and the cell-wall shrinks up. Collapsed cells may often be seen among the more perfect vesicles, mixed with globules of oil and fat granules. The fibrous element consists of filamentous tissue running between groups of adipose cells; but is denser, and occupies more space, according to the proportion in which it enters into the tumour. Steatomatous and melicerous fatty matter may sometimes consist chiefly of the cells or vesicles just described; or these may be mingled in various proportions with granular matter. In some melicerous encysted growths Dr. BENNETT found the whole to be composed of granules, among which faint traces of delicate cell-walls might be observed more or less compressed together. In all such productions the relative amount of the vesicular and granular element varies greatly.

70. Another form in which fat may occur is that of *atheroma*, consisting, for the most part, of numerous fatty granules, varying in size. Atheroma may constitute the contents of cysts, or the entire degeneration of certain glands, especially the mesenteric and lumbar. The fatty granules composing it vary from 1-600th to 1-400th of a millimetre in diameter. They almost entirely disappear in ether, leaving only a molecular albuminous matter. Similar fatty granules are also associated with most morbid formations, sometimes free, at others existing within cells. "This kind of atheroma is identical in structure and chemical composition with certain forms of the reticulum in cancer. The granular fatty matter is often combined with crystals of cholesterine, more or less numerous." Sometimes they accompany various kinds of chronic exudation, and formations of epithelium, as above noticed (§ 53.).

71. *F. Tubercular growths resembling cancer* are not uncommon. Dr. BENNETT remarks that a mass of enlarged tubercular lumbar glands in his collection presents all the external characters of cancerous growths; and that he has no doubt that many cases of so-called cancer of the brain and other structures in youth are only tubercular; for, however easily the tubercular structure may be distinguished in its miliary or infiltrated forms, it may closely resemble cancer when it exists only in one or two large rounded masses in an organ, and is more or less softened. In such cases it can be distinguished only by a microscopic examination. The characters of tubercle which readily distinguish it from cancer therefore require to be pointed out. A tubercular mass presents a yellowish or dirty white colour, and varies in consistence from that of tough cheese to that of thick cream. Sometimes it is soft in one place and indurated in another. On dividing the harder parts, the surface is smooth or waxy; the softer parts present a slightly granular surface. On pressure they are friable, and break down into a pulpy matter, but never yield a milky juice. "A small portion squeezed between glasses, and examined under the microscope, presents a number of irregular shaped bodies approaching a round, oval, or triangular form, varying in their longest diameters from the 1-120th to 1-75th of a millimetre. These bodies contain from one to seven granules, are unaffected by water, but rendered

very transparent by acetic acid. They are what have been called tubercle corpuscles. They are always mingled with a multitude of molecules and granules, which are numerous as the tubercle is more soft. Occasionally, when softened tubercle resembles pus, constituting scrofulous purulent matter, we find the corpuscles more rounded, and approaching the character of pus-cells. They do not, however, on the addition of acetic acid, exhibit the peculiar granular nuclei of these bodies." Tubercle corpuscles are very readily distinguished under the microscope from cancer-cells. Compound granular masses and cells, mineral matters, crystals of cholesterine, and the debris of the texture in which the morbid product is found, are also often detected in tubercular masses of some standing. These masses may also be sometimes transformed more or less into cretaceous and calcareous substances and either remain latent or be thrown off.

72. *G.* A tumour, which M. VELPEAU has called *fibrinous* is occasionally met with. It may, under certain circumstances, be mistaken for cancer. It is caused by an extravasation of blood, which coagulates, becomes paler, and ultimately yellow, like a clot of blood in the sac of an aneurism. These tumours vary in size, may occur in various situations, especially in the female breast, when they may be mistaken for cancerous tumours. Dr. BENNETT has also seen these tumours in different textures, especially in the placenta and in the spleen. The structure of one found in the spleen consisted of numerous molecules and granules, fusiform corpuscles, compound granular masses, and irregularly formed bodies, probably altered blood corpuscles, such as are commonly found in old extravasations. Instances in which these tumours in the breast were mistaken for cancer have been recorded by MM. LEBERT and BERARD.

73. *H.* A peculiar form of tumour, which HENLE has called *syphnoma*, is described by him and Dr. BENNETT. The specimen seen by the latter consisted of a large mass attached to the mesentery, that was in one place hard, fibrous, and nodulated, in another soft and cheesy, or even purulent, and in a third fibrous, but soft and of a dark red, resembling coagulated blood. Having been long steeped in spirits its minute structure could not be exactly ascertained. The part examined resembled a vascular plexus, anastomoses here and there having been distinctly seen.

74. *I.* The *enlarged glands* which accompany *typhoid ulcerations* in the intestines, and which are sometimes found especially in the mesentery, will rarely be mistaken for cancer. They vary in size from that of a hazel-nut to that of a hen's egg. They are vascular externally, of a bright red or purple colour, are soft and pulpy to the touch, and on section present a slightly granular surface, of greyish or fawn yellow colour, frequently exhibiting the commencement of softening. They are friable, and yield a greyish, or dirty purulent-looking fluid on pressure. The matter infiltrated into the texture of the gland is the typhous deposit of ROKITANSKI, ENGEL, and other German pathologists. The fluid squeezed from these glands was found by Dr. BENNETT crowded with cells, naked nucleoli, blood corpuscles, granules and molecules. The cells are generally spherical, varying in diameter from the 1-50th to the 1-35th of a

millimetre. The nucleus occupies about three-fourths of the cell, and is composed of an aggregation of numerous nucleoli, of about the 1-200th of a millimetre in diameter. "Sometimes from one to four of these nucleoli are seen scattered within the cell, either with or without a round or oval transparent nucleolated nucleus. On the addition of acetic acid the cell-wall is rendered very transparent, whilst the nucleoli are unaffected." Many of them are free, and looked at first like altered blood globules, from which they are at once separated by the action of acetic acid. I have called these bodies nucleoli, from their holding that relation to the nucleus in well-developed cells, although at other times they may be considered as nuclei, no other bodies being present within the cells."—(BENNETT, *Op. cit.* p. 200.)

75. IV. PATHOLOGICAL RELATIONS OF SCIRRHOUS AND OTHER TUMOURS. i. OF SCIRRHOUS GROWTHS.—*A.* The *origin* of these growths has been the subject of much discussion. In the article CANCER certain views of this matter have been noticed, but others have been recently published. It was supposed by VELPEAU (*Revue Médicale*, t. i. 825, p. 357.), from two cases in which encephaloid-looking matter was found in venous coagula, without disease of the veins, that cancer may form primarily in the blood. But there is no evidence that the matter was really cancerous in these cases. VIRCHOW, however, states that he has seen cancer in the large venous trunks in six cases, and that he is convinced that they may thus arise locally in coagula of blood. GLUGE and NONAT discovered cancer-cells in a clot in the right iliac vein, the walls of the vein being smooth and not red; but in these, as in several others which have been recorded, cancerous disease existed in the viscera, and the cancerous matter in the blood may have arisen from venous imbibition. In the present state of our knowledge there is no proof that cancer may exist in the blood primarily, or independently of similar growths in other parts of the body. It is possible, however, that the liquor sanguinis may, in peculiar circumstances, act as the blastema of cancer within the vessels as well as when exuded; such an occurrence however must be rare. Dr. BENNETT, whose researches have been so able, infers that the filaments, cells and fluid, which together compose scirrho-cancerous structures, originate in a coagulated exudation, which is poured out in the same manner as other forms of exudation—namely, by enlargement of the capillaries, their repletion with blood, and the transudation through their coats of the transparent liquor sanguinis, which, coagulating outside the vessel, forms an exudation more or less solid. The exudation when first perceptible consists of a finely molecular and granular matter, in which the cancer-cell arises as in a blastema, in the manner already described (§ 14.). This view accords with that which I have stated in the article CANCER (§ 26.); and shows that the change in the blastema, or exuded fluid, depends upon the state of constitutional and local vital endowment.

76. The exudation constituting the blastema of cancer is generally infiltrated between the filaments of areolar tissue. The nature of the tissue influences the formation of adventitious growths;

and the areolar tissue, probably from its lower vital endowment, seems to favour the production of scirrhus-cancer. While part of the exudation in this tissue passes into cells, another portion becomes fibrous, as observed to occur in a simple exudation during the healing of an ulcer or wound. All that is known of this stage of the production is, that filaments and fibres are formed, which are interlaced among the granules and cells of the blastema, to constitute the stroma of the growth, the form and density of which is dependent upon its arrangement and amount. "At first the cancerous exudation is fluid; and some of the albuminous principle held in solution, by coagulating, allows a certain quantity of serum to be set at liberty. In most instances this is in a great measure absorbed; but in a few, owing perhaps to some peculiarity in its formation or amount, it is retained in the meshes of either the pre-existing or new areolar tissue." Such Dr. BENNETT considers to be the origin of colloid cancer. The colloid matter so collected becomes in turn a blastema for the formation of cancer-cells, as above described (§ 14.).

77. It is obvious that the exudation productive of scirrhus-cancer must differ, either primarily or consecutively, or both, from the exudation of inflammation, or of scrofulous or tubercular cachexy. In what the difference consists we are ignorant. In this the histologists have not enlightened us. Most probably the cancerous exudation is primarily different from these, owing to the state of vital endowment of the tissue affected, and that the difference increases with the retention of the exudation in the tissue which it infiltrates. The characters imputed to the blood by ROKITSANSKI, ENGEL, HELLER, and others, assigning a specific dyscrasia of the blood, or an excess of albumen or of fibrin in the blood, are vague, uncertain, and unsatisfactory. Dr. BENNETT believes that the cancerous peculiarity depends not upon the vascular system, which is the mere apparatus for the production of the exudation; not upon the nervous system; and not upon the texture, which is merely the seat of the exudation, as that varies: but in the inherent composition or constitution of the exudation itself. But, in this belief, this pathologist is not sufficiently precise; for if he means by the nervous system the spinal nerves, then it may be admitted that these can have little or no influence in determining the nature of the adventitious growth produced from a fluid blastema. It is, however, by no means so certain that the soft or ganglionic nerves, which supply the vascular system, and which preside over nutrition and secretion, are so unconcerned in determining the nature and growth of the morbid formation as here stated. We know that all the forms of scirrhus-cancer appear in circumstances and from causes which depress organic nervous energy, and impair the activity of the excreting or depurating functions; and which, moreover, diminish vital resistance, and favour the development of adventitious cell-formations and of parasitic productions. As these cell-formations become more perfect, and acquire the power of self-development, so as to spread and invade adjoining tissues, they soon burst forth, ulcerate, contaminate the circulation, and form exuberant fungoid excrescences, filling up or even extending beyond the textures which they

destroy; and they thus impoverish and infect the fluids, and exhaust organic nervous or vital power. (See arts. CANCER, §§ 11. *et seq.*, and DISEASE, §§ 151. *et seq.*)

78. B. The growth of scirrhus-cancer is merely the extension of the fibrous tissue, cancer-cells, and nuclei above described (§§ 41. *et seq.*). The old cell-walls dissolve or break down, and the included new cells and nuclei are liberated, and give rise to others in turn. For this purpose, however, a certain amount of blastema is requisite. "This is obtained at first from the original exudation poured out; but, after a time, as the fibrous tissue increases, new vessels are formed in it, which continue to furnish materials for the new growth, in the same manner as the old vessels furnish materials of growth to the old tissues." A pre-existing tissue exerts much power over new formations in its substance or immediate vicinity; and hence, when a bone is fractured, the matter exuded is transformed into bone; and other tissues are restored when divided by a texture analogous to the one injured. "Very compound tissues, as the skin, lungs, muscle, &c., are never completely restored, but a cicatrix is formed, composed of fibrous tissue. On the other hand, epithelial and epidermic structures are easily restored and reformed, and so are all textures which wholly consist of cells. Hence the more a cancerous growth abounds in cells, the more rapidly it grows, and the greater is its power of re-development." Some pathologists suppose that this power depends upon pre-existing and permanent nuclei, or germinal centres. But as to the truth of this, Dr. BENNETT does not inquire, considering it sufficient to know—what, however, was sufficiently known before histology came into vogue—"that a tissue once formed and furnished with blood-vessels possesses the property of growth; that is, of exerting a species of selective vital attraction on the blood, whereby such matters are transuded through the capillaries as are readily transformed into a substance like itself." But this act of growth, which I believe to be correctly attributed to vitality, the sect of chemical pathologists would consider as altogether chemical; whilst another sect would consider it as simply one of endosmosis. Of the more prominent features of the growth of cancer, and of the extension of the malady and contamination of the circulation, I have nothing to add to what has already been stated in the articles CANCER and FUNGOID DISEASE.

79. C. *Is cancer contagious?* This question has been answered in the negative by some, and in the affirmative by others. Inoculation has even been resorted to in order to test the fact.—(a.) The negative evidence is chiefly the following. Dr. WALSHIE says that he has known women afflicted with advanced cancer of the uterus take refuge in hospitals from the importunities of their husbands, and that these men were perfectly free, according to the assurance of their wives, from ulceration of any kind. Dr. BENNETT states that his hands, more than once, have been immersed in the creamy fluid of encephaloma, whilst recent scratches have been upon them, without the slightest irritation having resulted. VOGEL states that he injected fresh cancer-cells from a tumour into the blood-vessels of a dog, without any morbid change being manifest eight months after-

wards. GLUGE has also been unsuccessful in his attempts to inoculate the disease.

80. (b.) The affirmative evidence is chiefly the following. LANGENBECH injected the fluid from a cancerous tumour, while still warm, into the blood-vessels of a dog, with the effect of inducing secondary cancerous formations in the lungs of the animal. Dr. WATSON states that he has known two cases of cancer of the penis in men, whose wives were afflicted with cancer of the uterus. Some years ago, a patient was attended by Mr. MAYO and myself who was the subject of carcinoma of the penis and inguinal glands, and who soon afterwards died of the disease. The malady had commenced in the glans penis, and he had infected his wife, who was found on examination with open cancer of the os uteri; and she died of the disease a considerable time after her husband. In this case there was no doubt of the husband having infected the wife, owing to the morbid matter from the ulcerated glans penis having been left in undisturbed contact with the os uteri. Mr. MAYO informed me that he had met with another case altogether similar to this. Dr. BENNETT asks if the cases, to which Dr. WATSON has alluded, were proved to have been cancer by a microscopic examination? But he has already shown that such examination adds but little to the diagnosis of cancer; and it is well known that the majority of cases of open cancer, as these were, are so obvious, as not to be mistaken even by the most inexperienced. Dr. BENNETT concludes, that it is certainly opposed to experience that cancer can be communicated by contact or inoculation. I believe, however, that it can be so communicated, if circumstances favour the communication, more especially if the recent discharge from a cancerous ulcer is brought into, and remains for some time in undisturbed contact with a mucous surface, or part denuded of its cuticle.

81. *D. Degeneration of cancerous and canceroid growths.*—Dr. BENNETT remarks, that it is with the life of a cell as with that of the most highly organised individual: “it has its origin and birth, it gradually increases until it reaches maturity, then declines or degenerates until it has ceased to exist. The individual elements of a cancerous growth, like those of the healthy tissues of the body, are continually undergoing this process; like them, it leaves germs which continue to regulate its growth so long as they receive nourishment, and thus the structure, as a whole, is perpetuated. Sometimes this process receives a check from the cells, which are the entire agents of growth, being rendered abortive, and the result may be—1st. A fibrous cicatrix;—2d. A fatty mass;—or 3d. A calcareous concretion.”—(*Op. cit.* p. 210.)

82. (a.) It has been stated above (§ 78.) that the cell-wall of the cancer-cell dissolves and breaks down, and thus liberates the young cells. This is the natural completion of individual cell-life. It has been shown that the increase of cells is dependent upon a due supply of blastema, in order to supply the materials of assimilation. Several cases are known, and one has come under my own especial and prolonged observation, when a cancerous ulcer has undergone the same changes as a simple ulcer; the cancer-cells in the one, and the pus-cells in the

other, becoming gradually less in number, whilst the fibrous element has increased and terminated in the formation of a cicatrix. Dr. WALSHÉ has adduced several instances of this transformation; and Dr. BENNETT thinks that this is a more frequent occurrence than is generally supposed. The only question is whether the pre-existing morbid growth was actually cancerous or not; but the local appearances and sensations, and the constitutional symptoms, have certainly been such, in rare cases, as warranted the inference that the growth was actually malignant. This writer states, that Dr. BOCHDALEK of Prague has met with instances of cancer of the liver, in which the diseased structure broke down into a cream-like matter, the fluid parts being absorbed, and the whole shrinking together, forming a puckering on the surface often corresponding to a fibrous mass, or a fatty material, in which collapsed cancer-cells may be detected.

83. (b.) It has been stated above (§ 14.) that the cancer-cell may be rendered abortive by the deposition of fat-granules between the nucleus and cell-wall, and by their pressure upon the former, and the ultimate disintegration of the whole body into numerous fatty molecules and granules. “This is a very common termination of the life of individual cancer-cells; and, when the process is carried on to any great extent, the fat granules often collect in masses, and mingle with old cells, which exhibit various stages of their retrograde progress, and old nuclei, which have more or less resisted disintegration, are at length observable to the naked eye. In this manner the yellow masses, and yellow reticulated appearance in certain cancerous growths of some standing are produced—an occurrence so common that MÜLLER described it as a particular form of the disease, under the name of *cancer reticulare*.”—(p. 212.)

84. Professor BENNETT, H. MECKEL, and VIRCHOW, agree in describing the reticulum of MÜLLER as disintegrated cancer; or as composed of broken-down cancer-cells, the nuclei of which sometimes remain; at other times the whole has undergone the fatty transformation, and been converted into compound granular cells; and not infrequently, in the last stage of the process, nothing but molecules and granules can be discovered. Dr. BENNETT considers that this change is not a proof of so-called secondary inflammation of the growth, as is supposed by WALSHÉ, ROKITANSKI, and LEBERT; but that it is the same transformation that occurs in all old exudations, and in various organs where pre-existing cells undergo the fatty transformation, as in the liver, to constitute fatty liver, the kidney to form BRIGHT'S disease, &c. The matter forming the reticulum occurs in two forms. In one, it is seen in the fresh-cut surface, scattered throughout the growth, in the form of a net-work, more thick, however, and abundant in some places than in others. In the second form it forms masses, of a bright yellow or orange colour, occasionally resembling tubercle, more or less friable, and of cheesy consistence. In the former compound granular corpuscles are most common; in the latter, irregular bodies, resembling tubercle-corpuscles, resulting from alteration in the form of the nucleus, after the cell-wall has been broken down. These are called bodies of the reticulum

